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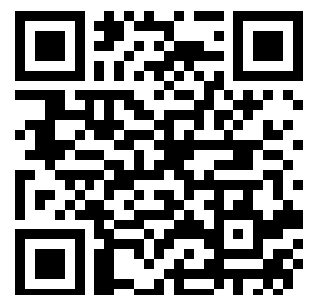
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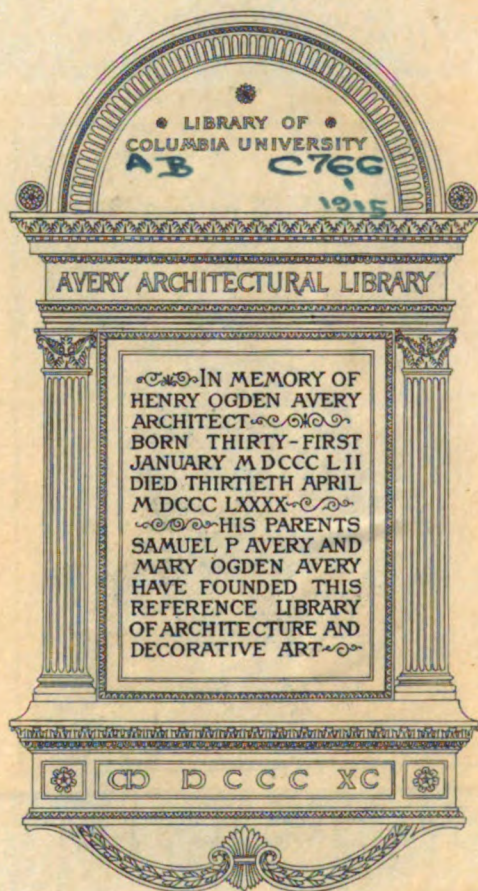
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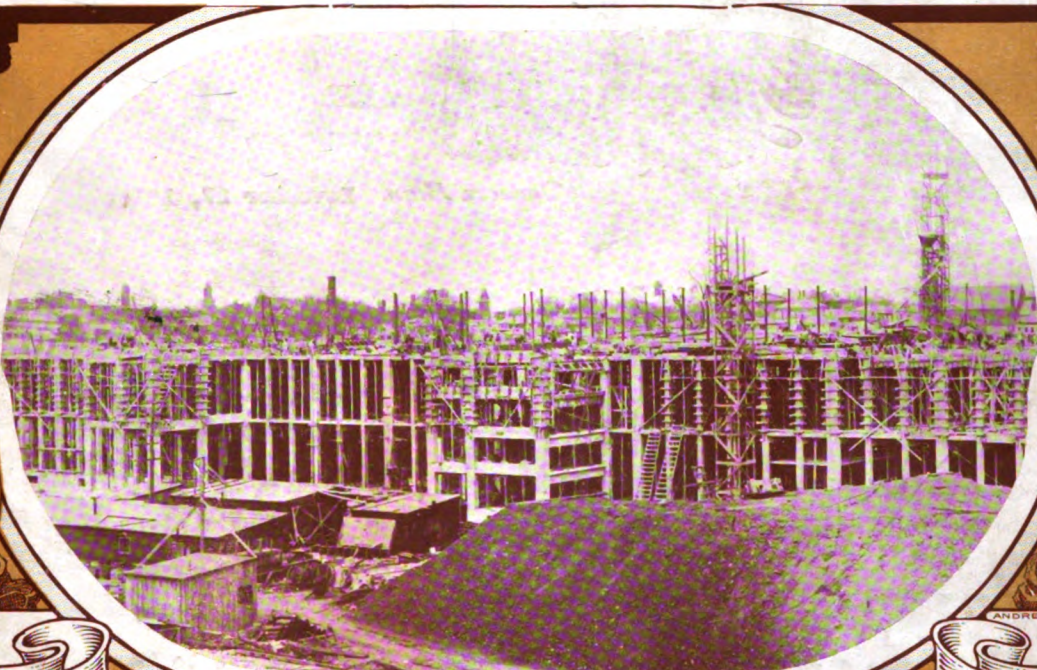


CONSTRUCTION

ADVOCATING THE CONSISTENT USE OF
FIREPROOFING MATERIALS & PROTECTIVE DEVICES

WITH A DEPARTMENT DEVOTED TO
SAFE HOMES

Vol. 1, No. 1, 1915



OCTOBER, 1915

THE FIREPROOFING OF STRUCTURAL STEEL

THE RECONSTRUCTION OF SALEM

ORGANIZING THE WAR

AGAINST

FIRE

OFFICIAL ORGAN OF SOCIETY



ADVOCATING FIRE ELIMINATION

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CONSTRUCTION IS OUT TO FIGHT YOUR BATTLE—not blindly, but with an experienced editorial, engineering and business staff acquainted in the many intricate problems presented by legislative enactments, building laws and codes, insurance regulations, the conditions peculiar to various industries, organization, publicity, and the numerous requirements necessary to promote and encourage the erection of consistent firesafe structures through a wider national knowledge of the materials and devices needed, their proper use, and the economic and other losses thereby avoided.

The manufacturers of fireproofing materials constitute the only industry which has no national publication to represent, protect and advance their interests.

CONSTRUCTION is the Industry's permanent, nation-wide, intelligently directed technical publication, devoted to the promotion of consistent firesafe construction and to the advancement of every art, product and service prospering this ideal.

ALBERT H. EICHHOLZ,
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CONSTRUCTION

WITH A
DEPARTMENT DEVOTED TO
SAFE HOMES

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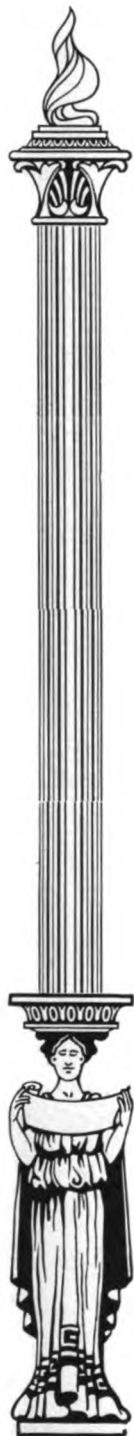
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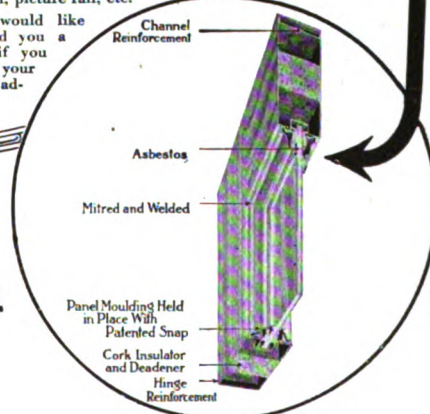
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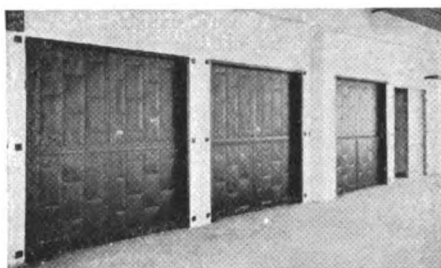
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is obtained by using truckable counterbalance

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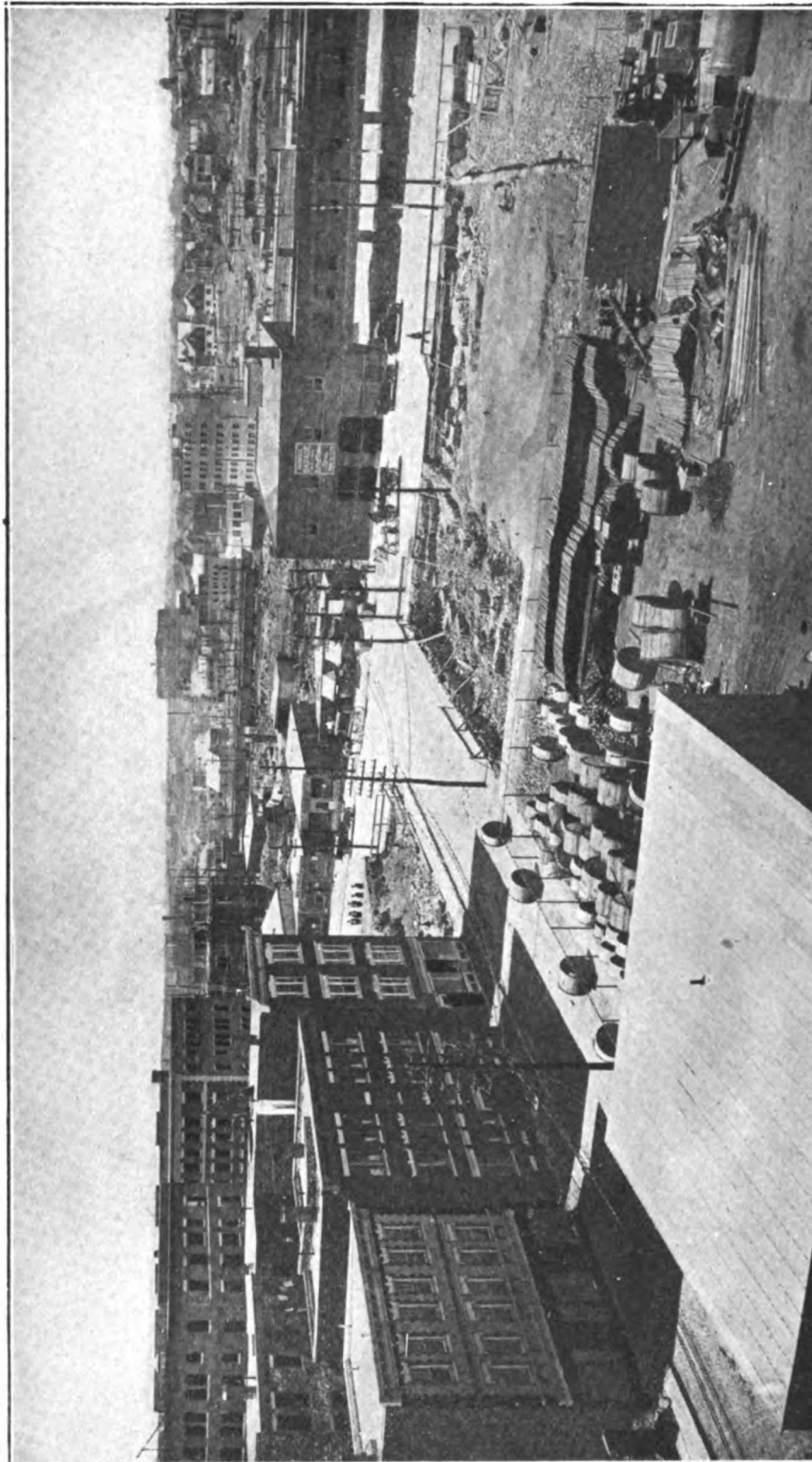


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Manufactured by

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Columbus, Ohio



Salem, Ever Historical in its Associations, Has Added a Splendid Page to the Modern History of Progressiveness in Community Building



CONSTRUCTION

WITH A DEPARTMENT DEVOTED TO
SAFE HOMES



VOL. I

OCTOBER, 1915

No. 1

THE RECONSTRUCTION OF SALEM

At this time, when the total value of the new construction work now being carried on in Salem is nearly equal to the value of the buildings destroyed in the sweeping conflagration of June 25, 1914, a careful analysis of the new building code and building practices shows clearly that the lesson of the fire has not been unheeded and that Salem has taken a long forward step toward the consistent protection of communities against the everpresent fire hazard.

While it is true that a brief consideration of the formation of various executive bodies which were created for the purpose of directing the reconstruction work in Salem is a divergence from the subject of consistent fireproofing, still the conception and work of these bodies should be of educational interest to all, due to the fact that, in the short time which has elapsed

since the great fire, order has been restored, the commercial prosperity of the city safeguarded, and a new conflagration-proof Salem is growing swiftly from the ashes of last year.

The Rebuilding Commission

The first step, one which must be taken by every community situated as Salem was immediately after the fire, was to place the reconstruction work out of the zone of political influence in order that public safety should not be made secondary to property interests. For this purpose the Governor of Massachusetts was asked to appoint a rebuilding commission of five men, to hold office for three years, and, as these offices were created by a special act of the State Legislature, so they cannot be removed except by a similar act. Into the



The largest weave-shed in the world

hands of this commission was placed the entire reconstruction work, full jurisdiction being given to them.

The Rebuilding Trust

A noteworthy feature of the reconstruction of Salem, and one which should offer a practical suggestion of great value to communities which, having been ravaged by fire, are seeking for the best plan of organized effort along rebuilding lines, is the conception, formation and work of the Salem Rebuilding Trust, formed for the purpose indicated.

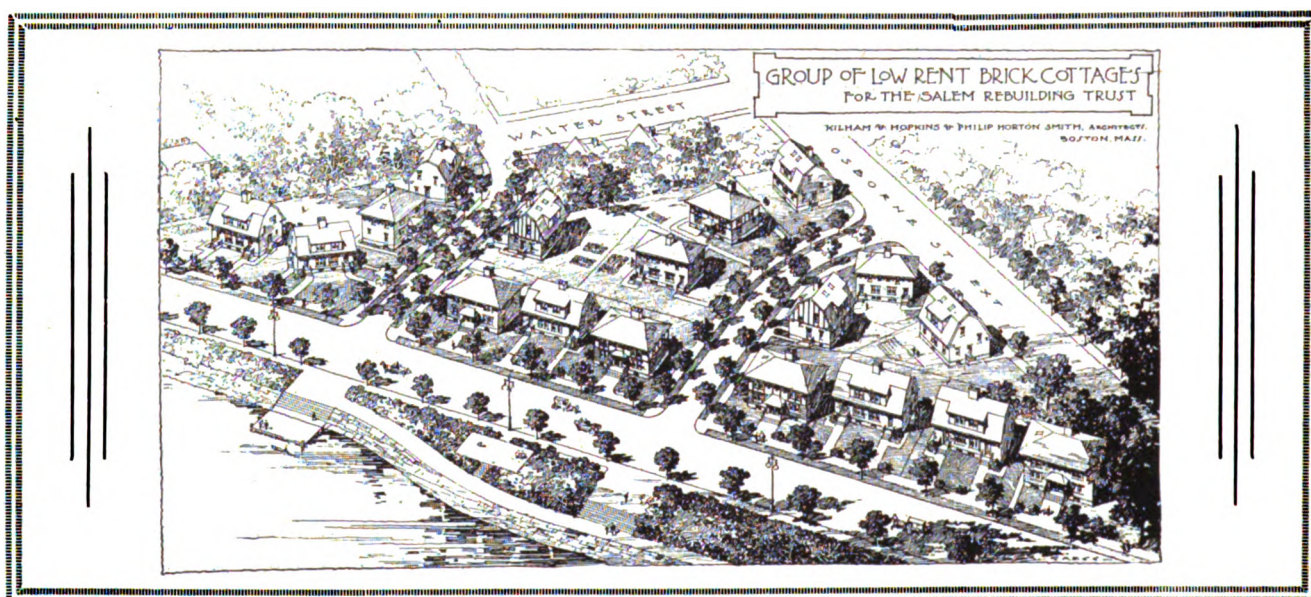
From the relief funds \$100,000 was set aside for the purpose of assisting those who were burned out in the rebuilding of their homes; and to provide suitable living quarters for the laboring class, this money being placed at the disposal of the newly formed Rebuilding Trust, to be expended at their discretion.

In the case of those who wished to rebuild homes and owning their land, but not having funds with which to build, the following judicious course was adopted. From the various

the rents will be as low as \$15 per month, is commercially profitable, in order to induce a continuation of this exemplary work by speculative builders. (Full particulars of these houses may be obtained by addressing the New York office of "Construction.")

Adopt New Building Code

Profiting by the lessons of the conflagration, and determined, so far as lay within their power, to make its recurrence impossible, members of the Salem Council some months ago adopted a series of well-considered ordinances governing the location, construction, alteration and repair of all buildings. While the new ordinances are not all that could be desired from a firesafe standpoint, nor what the councilmen themselves would have liked, they are yet so far in advance of those found in other communities of like, or even far greater size, as to serve as admirable models to pattern after. The use of lumber in dwellings under defined limitations is permitted, the lawmakers appreciating that the great majority of the

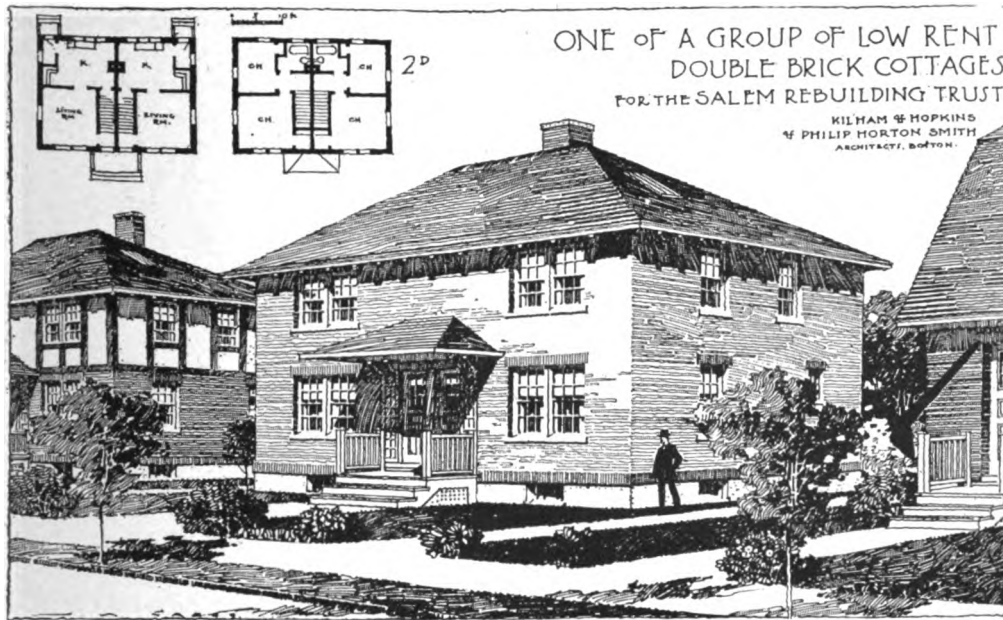


banks a loan of 60 per cent. of the combined value of the land and proposed building was obtained, and the balance necessary to complete the building loaned to the owner by the Rebuilding Trust as a second mortgage at the reasonable interest rate of 4 per cent. This money when repaid will be turned over to the State of Massachusetts as a special fund to be used to assist other unfortunate communities.

Of very great interest from the standpoint of practical building for the purpose of obtaining immunity from the conflagration hazard, and at the same time provide pleasant homes at low rental for the laboring classes, is the group of houses as shown in the sketch herewith. This is another activity of the Salem Rebuilding Trust and is an excellent beginning along the lines of practical community building. The houses are of brick, with unburnable roofs to avoid conflagration danger, and the purpose of the construction of this group is to show that such building of double houses, where

smaller householders of the city under existing conditions are unable to make the initial investment that the complete use of non-combustible materials would entail. Use of wooden shingles, however, is strictly barred, the menace from this practice being fully recognized.

Fire limits of the city have been fixed as follows: "Beginning at the corner of Summer and Essex streets, then running southerly through the middle of Summer street to Endicott, thence easterly through the middle of Endicott street to Mill street, then southerly through the middle of Mill street to Canal street, then southerly through the middle of Canal street to Pond street, then easterly through the middle of Pond street to Washington street, then diagonally across Washington street to Harbor street, then easterly through middle of Harbor street to Lafayette street, then northerly through the middle of Lafayette street to Ward street, then easterly through middle of Ward street to Union street, then easterly



An
Attractive Type
of Brick House
with
Unburnable
Roof

and northerly through middle of Union street to Derby street, then westerly through middle of Derby street to Elm street, then northerly through middle of Elm street and Washington square west to Brown street, then westerly through middle of Brown street to Howard street, then northerly through middle of Howard street to Boston and Maine Railroad tracks, then westerly along said tracks to Bridge street, then westerly through middle of Bridge street to North street, thence southerly through middle of North street to Essex street, thus including the business and manufacturing sections.

Classification of Buildings

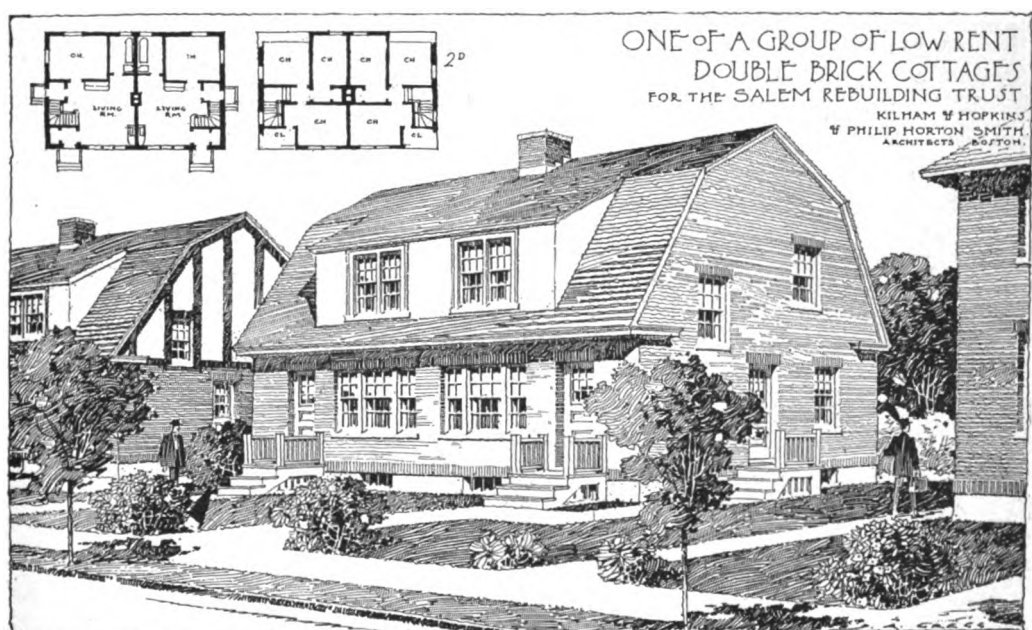
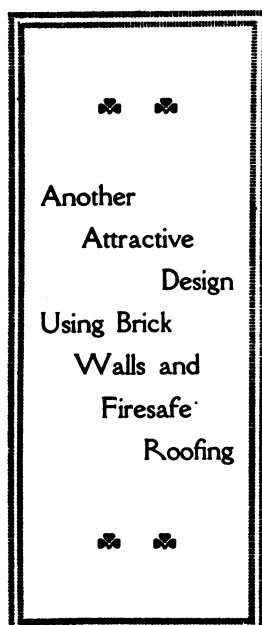
Under the code, buildings have been divided into six broad classes, the distinctive features being as here noted:

First Class.—Structures of this type "shall consist of fire-

proof material throughout, including floors, walls, partitions, etc. In such construction wood may be used only for finished floors, inside finish, windows and doors and isolated furrings."

Second Class.—Limited to five stories and sixty-five feet in height, buildings of this class shall possess self-sustaining external walls, "incombustible material, with roof coverings of incombustible material and with cornices and gutters of metal." The use of wood is permitted for floors, roofs and partitions.

Third Class.—All residences designed to accommodate more than two families comprise this class. If not over two and one-half stories high and housing not more than four families, "it may be built in the manner prescribed for fourth class houses, but it must have a self-sustaining firewall not less than eight inches thick between the suites, and the partitions





The
French Church
at Salem
Before Destruction



about the stairways must be filled solid with brick or other equally incombustible material." If more than two stories in height and accommodating more than two families it shall be constructed in the same manner as provided for second class buildings, and such buildings, if erected in blocks, shall have fire walls at each end and between the stacks of suites. Buildings shall be limited to four stories and fifty-five feet in height.

Fourth Class.—This class is restricted to residences arranged for one or not to exceed two families. They must have roofs covered with incombustible material, and if gutters are used these must be of metal, no wood to be used.

Fifth Class.—All structures designed to contain both residence and commercial premises shall be known as of the fifth class. If to house one family only, not to exceed two and one-half stories in height, it may be erected of wood, but the exterior "shall be covered through with some incombustible material. If accommodating more than one family, or exceeding more than two and one-half stories in height, it shall be either of first or second class construction and shall not be more than four stories in height."

Sixth Class.—Sixth class buildings are those planned for manufacturing, storage or mill purposes. "They must be

either of first or second class construction or constructed with a mill frame, with the exterior covered with slate, tile, metal or some other equally incombustible material." A sixth class building or mill construction shall not be more than four stories in height.

Stables.—When designed to accommodate more than four horses stables shall be constructed as are residences of the fourth class. If more than four horses are to be housed the rules governing buildings of the first or second class shall apply, or with wood framed walls, the exteriors of which are covered throughout with slate, tile, metal or other equally incombustible material.

General Regulations.—Residences must not occupy more than 75 per cent. of the building plot. In manufacturing structures all openings within 15 feet of adjoining property "shall be fitted with metal or metal-covered doors and frames, sash with windows of metal or metal-covered doors and frames, sash with windows, of metal or metal-covered frames and glazed with wire glass." Roofs must be covered with incombustible material, like regulation applying to all dormer windows. Spaces between and behind all furring of masonry walls and between parts of the floor beams that rest upon bear-

ing stud partitions shall be filled in solid with incombustible material.

All vertical shafts for whatever purpose used must be fire-proof throughout, while openings into such shafts must be protected by metal or metal-covered doors, shutters or windows. If glass be used it must be wired. Chimneys must be built of brick or other incombustible material.

Cement plaster must be used upon the walls, ceilings and partitions in fifth class buildings. Connections between the mercantile and residence portions "shall be only through self-closing doors with metal-covered frames."

Automatic Sprinklers.—In the absence of adequate connection with water mains all manufacturing properties exceeding two stories in height must be thoroughly equipped with automatic sprinklers.

Terra cotta or other incombustible material must be used in protecting all stairways in the third class buildings. Doorways opening therefrom shall be of metal or metal-covered.

Fireproof doors are required in all manufacturing buildings, while skylights must be metal or metal covered.

Mill Construction.—This type of structure is defined by the code as being "buildings without hollow or concealed spaces; having wood frame covered with suitable boarding and slate or asbestos, metal or other incombustible material for exposed surfaces, or brick or concrete walls; with roofs of two and three-quarter-inch splined or tongued and grooved planking spiked directly to heavy roof timbers not less than six inches in the least dimension, covered with metal or other approved incombustible roof coverings; having solid floors, without unprotected openings, constructed of not less than two and three-quarter-inch splined or tongued and grooved planking, covered with one inch top flooring laid crosswise, or diagonally, properly nailed and having between the top flooring and the planking not less than two thicknesses of waterproof material carefully laid to brace joints and flashed at least three inches around all wall posts or columns with moldings or mopboards, in which the size and spacing of floor timbers are suitable for the load to be carried, the timbers in no case being less than seven and one-half inches in

the least dimension, and resting on top of girders, or on stirrups, or on iron or steel caps or columns; with girders and floor timbers resting on iron or steel caps or columns, with girders and floor timbers resting on iron or steel plates in the walls and on iron or steel caps or columns, arranged so as to be self-releasing, with columns and posts resting on pintles, the size and spacing thereof being suitable for the load to be carried, no wooden column or post being less than seven and one-half inches in the least dimensions, and all columns, girders and beams of wood being of solid material, and those of iron or steel being protected in a manner satisfactory to the inspector."

Supporting Walls.—The use of wooden girders in the erection of party, division or partition walls is prohibited; all such supports must be of iron, brick or stone, "and of sufficient size and strength to support the structure." Side, end or party walls must not be carried up in advance of the rear wall. Lintels used to support walls or other weights over openings shall be of sufficient strength to carry superimposed weight, and where supported at end by brick or piers rest upon an iron plate at least two inches thick, the full size of the bearing.

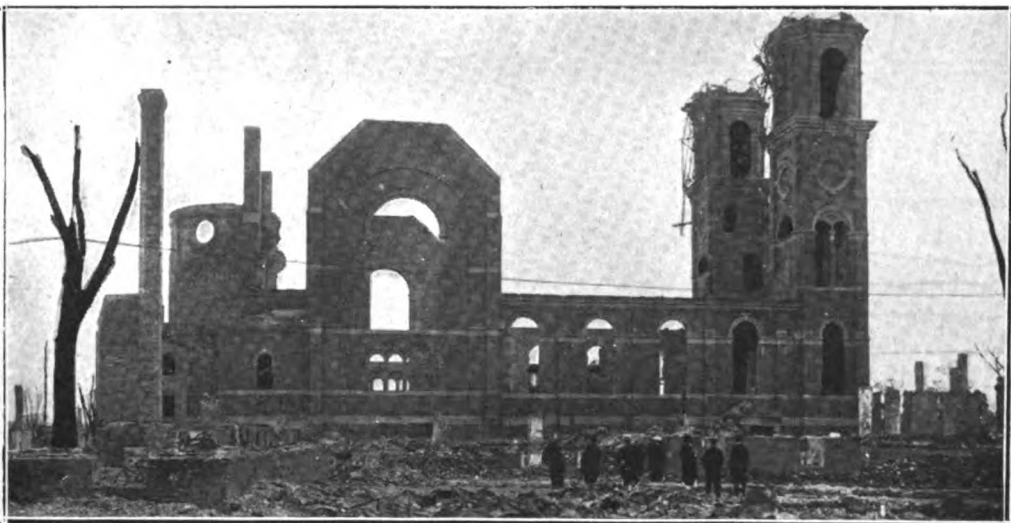
Party Walls.—"All party walls shall be carried up to a height of not less than two and one-half feet above roof covering, with the full thickness of the party wall, and shall be capped with stone or iron, securely fastened; and where there is a flat, hop or pitch roof the party wall shall be carried up to a height of not less than two and one-half feet above the roof covering at every part of said roof, and shall be corbelled at least twelve inches, or into the outer edge of all projections on the front or rear walls of the buildings."

Lintels used to support walls or weights over openings must be of sufficient strength to carry superimposed weight, and where supported at the end by brick walls or piers must rest upon an iron plate at least two inches thick, the full size of the bearing.

Wood Not Allowed.—"No timber shall be used in any wall of any building where stone, brick or iron is commonly used. No wooden lintels shall be allowed under any circumstances."



The
French Church
at Salem.
Result of Improper
Roof and Window
Construction

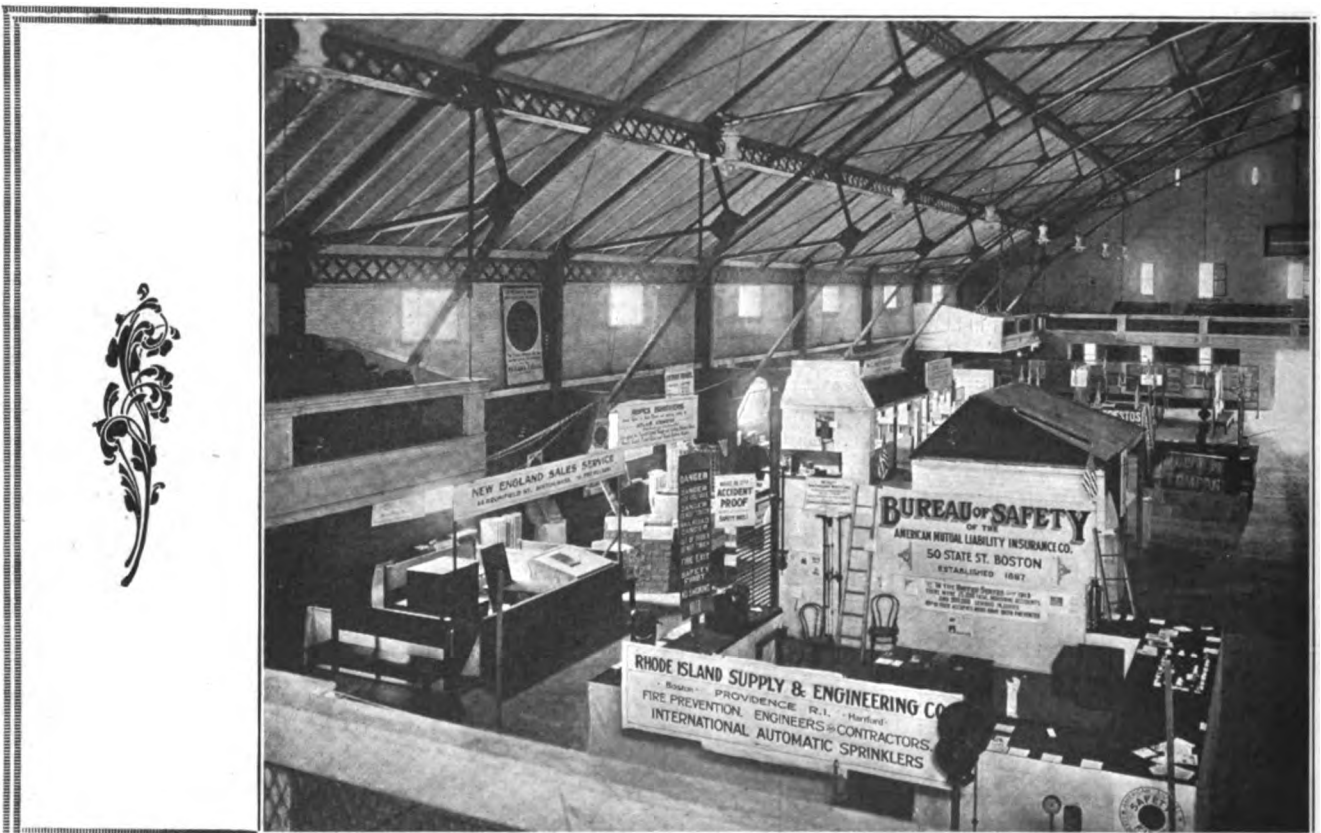


Protected Doorways.—Doorways cut through a party wall "shall be closed by two sets of wrought iron or metal-covered doors, hung to rebated iron frames and separated by the thickness of the wall."

Piers.—In pier construction only stone or well-burnt brick laid in cement, well wet when laid, is permitted. "Isolated brick piers under all lintels, girders, iron or other columns shall have a capstone at least twelve inches thick, or plate or iron two inches thick, the full size of the pier. For an external brick pier the plate may be reduced sufficiently in size to allow four inches of brick work to intervene between the edge of the plate and face of pier exposed to the weather. Columns

in height, and above each such opening there shall be not less than 2 feet in height of wall between the top of the opening and the ceiling line. The openings shall be provided with approved automatic self-closing standard fire doors on both sides of the wall. No wall or part of a wall in any existing building or in any building hereafter erected shall be removed to produce a larger area than that named above.

Parapet Walls.—Fire walls and party walls over 15 feet high shall have parapet walls not less than 8 inches in thickness, and carried 2 feet above the roof unless otherwise provided, but for warehouses, factories, stores and other buildings used for commercial or manufacturing purposes, the



An exhibition of fireproof materials and protective devices which was held in the armory at Salem at the time of the feasibility and value of

supported by brick walls or piers shall rest upon the iron plate at least two inches thick, or upon a granite capstone at least twelve inches thick, of a size satisfactory to the inspector of buildings. Under iron columns, in all cases, shall be an iron plate of not less than one and one-half inches in thickness."

Roof Timbers.—"All roof or floor timbers entering the same party wall from opposite sides shall have at least four inches of solid brick-work between the ends of said timbers."

Floor Areas.—In all buildings, save those of the first class, not completely equipped with automatic sprinklers, no single floor area, between brick fire walls, of a thickness equal to main bearing walls, shall exceed 7,500 square feet. Openings in fire falls shall not exceed 8 feet in width, nor 10 feet

parapet walls shall be not less than 12 inches in thickness and carried 3 feet above the roof and all such walls shall be properly capped with stone, terra cotta or incombustible material.

Buildings for Public Assembly.—In addition to the specific code requirements above recited, the City Council may prescribe special regulations governing the erection and use of "buildings intended for places of assembly of any sort, or for the storage or sale of inflammable materials or for the installation of bakeries, garbage or ash receptacles, or other special construction, or for lodging houses, apartments or hotels, or for buildings constructed with a steel frame."

No Frame Buildings.—Section No. 76 of the code deals

with wooden buildings and reads as follows: "No wooden or frame building, except a fourth class building, shall be hereafter erected in the fire limits, nor shall any wooden or frame building standing in said limits be added to, altered, raised, roofed, enlarged, or built upon, except as hereinafter provided. No such fourth class building shall cover an area of more than 2,000 square feet."

Protection of Flues.—"Where ranges or boilers are set, the outside of the flue to same shall be plastered on the outside directly upon the bricks up to the ceiling of the room, and no woodwork shall be placed on the outside."

Ash Receptacles.—"Depositions for ashes in the interior

advantages of using proper materials in the reconstruction of their factories, stores and homes, than by showing them standard fireproofing materials and methods at close range, an exhibit of such materials and methods was arranged as shown in the accompanying photograph.

Here were shown slate and asbestos roofing and side wall covering, concrete and terra cotta, and some 400 complete sets of plans of firesafe dwellings, factories and mercantile buildings that had actually been erected in other parts of the country—all the various materials and types of construction which tend toward making fireproof and conflagration-proof buildings; various tests of materials for roofing and other pur-



when reconstruction work was being commenced, for the purpose of educating the people to a proper conception firesafe construction

of any building shall be built of incombustible material."

In a general survey of the construction work one of the most striking features is the careful consideration being given to the proper protection of roofs. Slate and asbestos have entirely superseded wood. The newly restricted building lines making it necessary to have all homes at least 10 feet apart lend safety and attractiveness.

A Local Exhibit of Fireproofing Materials and Devices

The officials of the Salem Chamber of Commerce, realizing that in no way could the people be shown more clearly the

poses were also held from time to time and the results communicated to the general public.

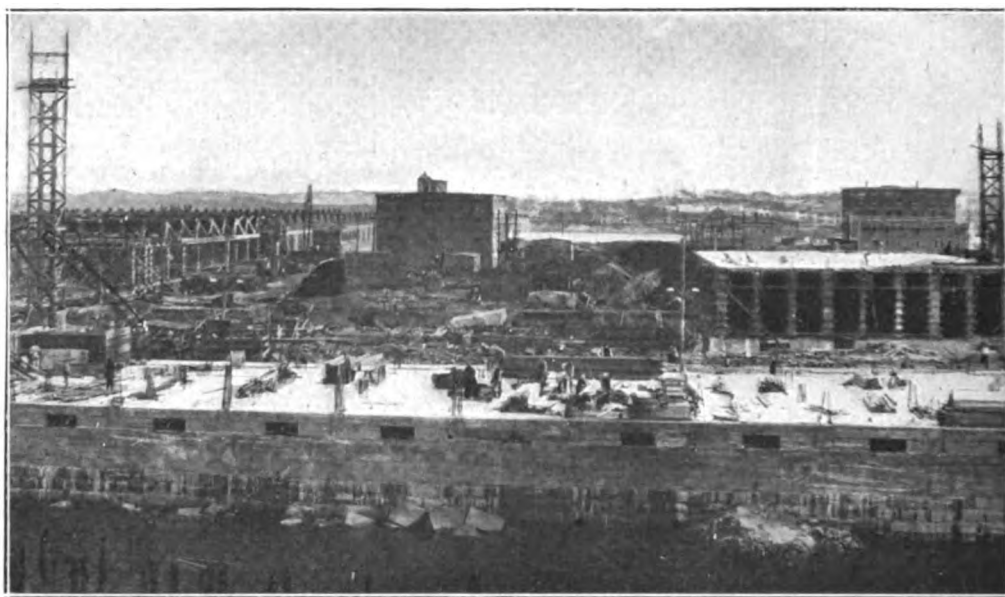
The results of these combined efforts show clearly in the construction now under way. Up to May 1, 1915, permits had been issued for 463 buildings, to be built at an aggregate cost of \$4,422,628. The estimated value of buildings destroyed in the conflagration is \$5,000,000, showing in a period of approximately nine months new buildings almost equal in value to those destroyed.

The following percentages are of especial interest in that they show clearly the improved building conditions.

卐 卐

Rebuilding
the Naum-
keag Mills,
at Salem

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Classified Construction

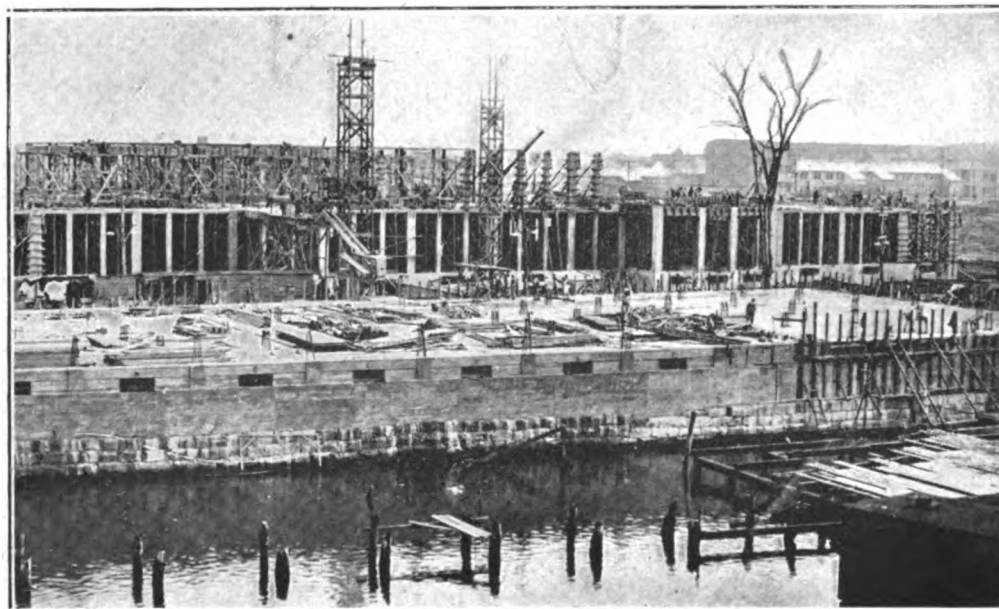
First Class—Fireproof material throughout, including floors, walls and partitions.....	37 per cent
Second Class—Walls of self-sustaining, incombustible material and with roofs, cornices and gutters incombustible.....	10 per cent
Third Class—Dwelling place accommodating more than two families which, if not over two and one-half stories in height and not accommodating more than four families, may be built in the fourth-class manner, but equipped with fire walls and properly protected stairways; also multi-family dwellings of second-class construction and limited to four stories	10 per cent
Fourth Class—Residence arranged to accommodate one or two families, roofs covered with incombustible material, metal gutters.....	34 per cent
Fifth Class—Combination residence and commercial or manufacturing building, covered exterior (incombustible), or if more than two and one-half stories of first or second-class construction	9 per cent

Rebuilding the Great Naumkeag Mills

A feature which adds great interest to the reconstruction work in Salem is the rebuilding of the great mills of the Naumkeag Steam Cotton Company, which were almost totally destroyed. The buildings, which are now practically completed, consist of a mill, storehouse and weave-shed.

The four-story and basement mill, 722 x 135 feet in dimension, and the five-story and basement storehouse, 500 x 110 x 55 feet, are being built of reinforced concrete beam and girder construction by the Turner Construction Company of New York City.

The floors of the mill are designed to carry a live load of 100 pounds per square foot and allowing headroom of 16 feet on each story. Ample light is afforded by spacious windows of which the frame and sash is of solid steel and glazed with wire-glass at all points where any conflagration hazard exists.



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Another View
of the
Naumkeag
Work

卐 卐



卐 卐

Reinforced
Concrete
Construction

—
Naumkeag Mills

卐 卐

The elevator and stairways, as may be seen in the architect's sketch, are located in smokeproof and fireproof towers having curtain walls of brick and built outside the building, thus affording ample facilities for escape and for getting at incipient fires. In this building the typical beam is 10 x 24, girder 14 x 31 1/2, and bay 24 x 26.

The storeroom is of similar construction, but designed to carry a heavier floor load, 150 pounds per foot. Windows are equipped in a similar manner to those in the mill.

The Largest Weave-Shed in the World

The vast weave-shed, containing 36 bays, 28 feet wide and 420 feet long, is the largest single shed of its kind in the world. Fred T. Ley Co., of Springfield, Mass., have the general contract for this work, and all concrete work is being done by the New England Concrete Construction Company, Boston, Mass.

The construction is of reinforced concrete, with sawtooth roof, and the equipment of the building is similar to that of the mill and storehouse. The skylight construction is of hollow metal, double-glazed, by the E. Van Noorden Company. A sidelight of particular interest is that members of the New England Concrete Construction Company, while with the Eastern Expanded Metal Company, constructed the concrete storehouse for the Naumkeag people, which went through the fire without even smoking the contents. This was an excellent example of proper firesafe construction, and its value is shown by the fact that, besides the saving of thousands of dollars' worth of finished goods, this building was immediately transformed into a weaving-shed, and cloth was turned out seven weeks after the fire.

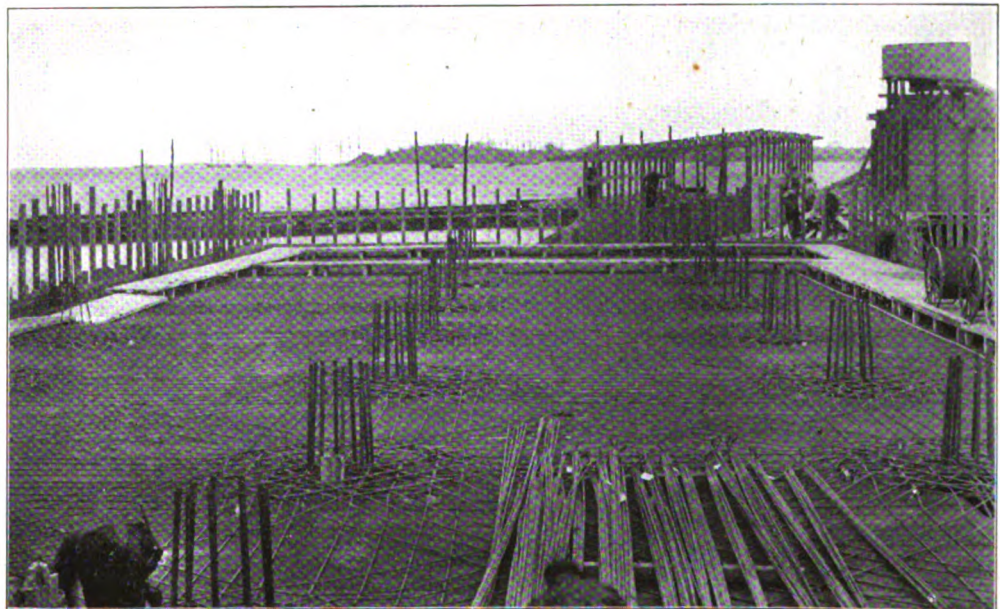
Throughout all these buildings protection of contents is insured by the installation of automatic sprinkler equipment.

Every community that has been ravaged by fire, and

卐 卐

Laying a
Reinforced
Concrete
Floor

卐 卐



those in which the conflagration hazard is high, will do well to profit by the lesson that may be learned from the destruction and successful reconstruction of Salem.

It cannot be expected that any community will, in one step, become ideal from the standpoint of consistent construction; but every step toward the doing away with wooden buildings, and more particularly with inflammable roofs, will be a step in the right direction.

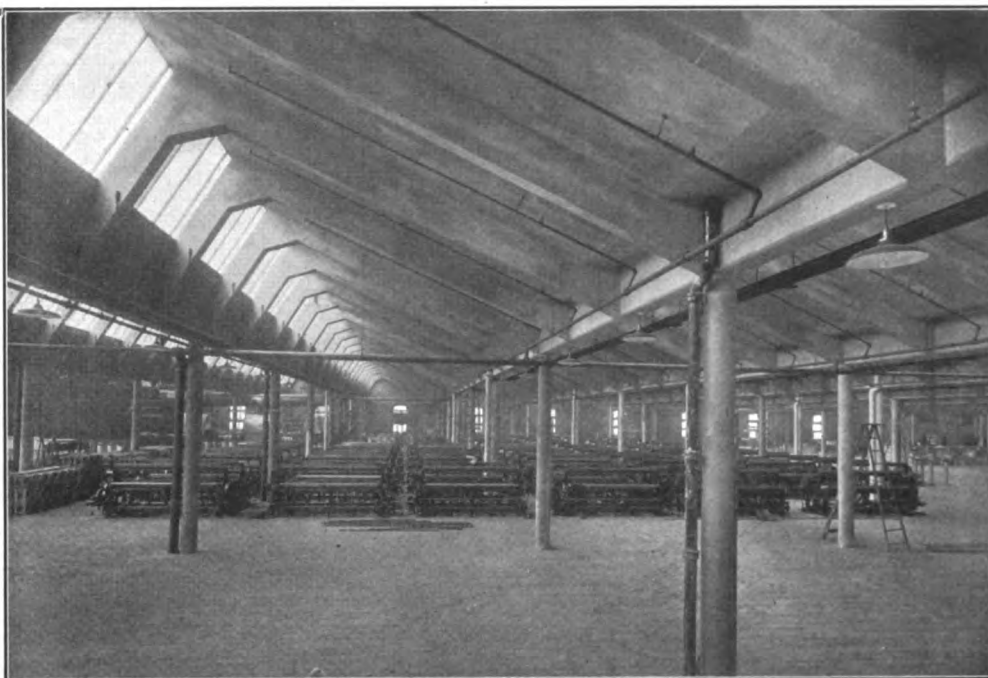
Conditions in Salem were no different from those now existing in thousands of American towns and cities. These may expect a conflagration at any time. The question is, will they wait until the lesson is driven home or will they begin now to force the use of incombustible materials in building construction? Every properly constructed building is in it-

inquire into ways and means of improvement. This committee should, in so far as possible, be removed from political influence, and formed of men who are strongly interested in local improvements.

This committee should immediately inquire from such sources at the National Board of Fire Underwriters, and others qualified to give such information, as to what is needed for the solution of their particular problems.

The greatest of conflagration breeders is the shingle roof, and this danger can be quickly lessened by enforcing the use of unburnable roofing on new buildings and in the repair of old roofs.

The construction of manufacturing buildings should be regulated properly. Don't let a man house himself in a fire-



Interior of Great Weave-Shed at the Naumkeag Mills Showing Consistant Fireproofing

self a firestop, every unburnable roof lessens the danger of a conflagration, and progressive boards of commerce, builders and architects should realize fully the great responsibility which they bear in this matter of decreasing the great fire loss.

The Lesson

There can be no doubt in the mind of any right-thinking citizen of the crying need for lessening the conflagration hazard in his own town or city. No matter how small the town, or how large the city, in every part of this great country wrong conditions exist.

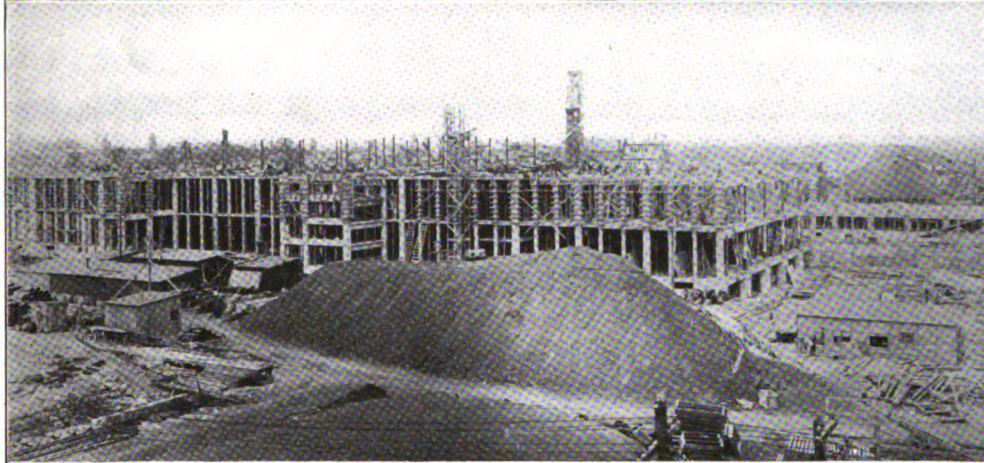
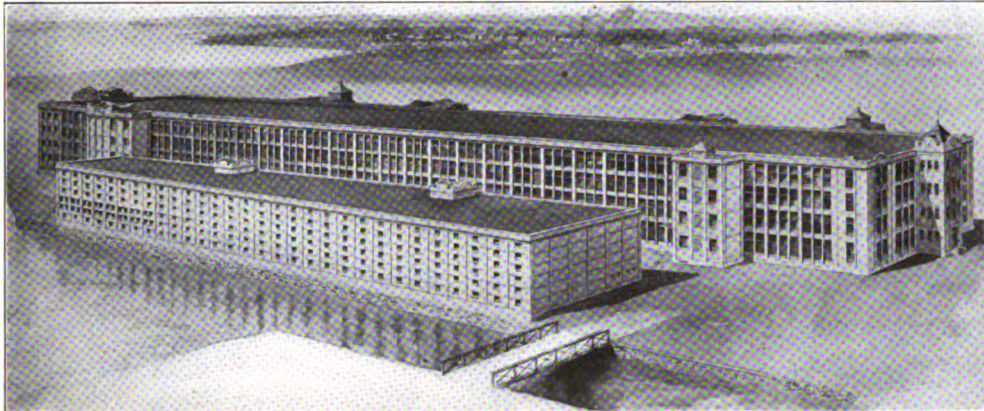
It cannot be expected that these conditions can be greatly improved in a short length of time, but if such improvement is commenced *now* and commenced *in the right manner*, the conflagration hazard will decrease rapidly. In small towns an active committee on fire prevention should be formed to

trap, even if *he* is willing; *start now to build your town right.*

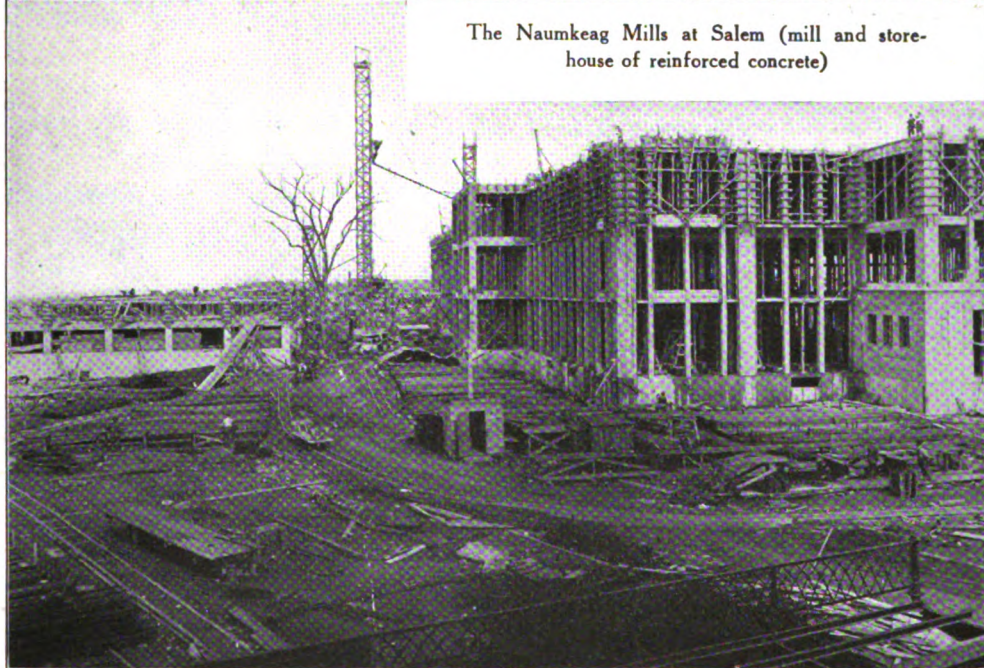
Too great care cannot be given to the construction of schools. Every day reports come in of schools burned and lives of children sacrificed. This and the destruction by fire of homes for the sick and aged constitute the most terrible fire crimes.

Let the matter of fire protection become one of intense local interest and pride. Only on this firm foundation will the structure of national fire protection ever be built.

Salem, ever historical in its associations, has added a strong page to the history of progress in the matter of consistent fire-safe construction, and it is to be hoped that the lesson of the city which is now rising from its own ashes will prove of value to the great cause of proper protection of property—and of life.



The Naumkeag Mills at Salem (mill and storehouse of reinforced concrete)





"I have surely built thee an house to dwell in, a settled place for thee to abide in forever."—1 Kings 8: 13.

THE aim and purpose of "CONSTRUCTION" in its appeal to owners, architects and builders, and to the makers of laws and codes governing building construction, is to encourage a needed reform in present building practices by showing how, by consistent planning, unburnable structures of every type may be built at little or no increase in cost.

IT is conceded that the only practical manner of reducing the fire loss in this country is by getting at the root of the evil—incorrect building construction. "CONSTRUCTION" is essentially practical—it will show how this can be done, how it is being done both in this country and abroad, for the purpose of obtaining the minimum of insurance and maintenance costs and the maximum of safety in building.

PROPERTY loss by fire is an economic loss—the loss of human life by fire is an unpunishable crime. Lawmakers, architects, builders and property owners are responsible for every life and every dollar lost by fire.

THE existence of a strong, selfish motive in the accomplishment of any reform is both human and desirable—is, in fact, necessary. The architect who plans a building which cannot burn, who can point to low insurance rates as a direct result of his skill; and the builder who builds such a building, are both strengthening their respective reputations and

each broadens his field of endeavor. The owner of an unburnable building must feel the sense of security which comes from an absolute knowledge of the immunity of his business from the disturbance incident to fire; he saves money in lower insurance and maintenance costs; his rental income is greater. Municipalities which enforce such construction quickly minimize the possibility of disastrous conflagrations, with their resultant direct and indirect losses, by providing efficient fire stops and causing hazardous businesses to be properly housed.

ON every hand the selfish interest in the successful solution of this great problem is plainly evident, and its solution is the consistent use of standard fireproofing materials and protective devices. Standard materials and devices must be used consistently and the use of wood in any form must be eliminated.

IT is not sufficient to construct a building with fireproof floors and partitions. The vertical openings must be consistently protected, conflagration hazards removed, fire areas subdivided; in short, incipient fires must be isolated and means provided for getting at and extinguishing them.

"CONSTRUCTION" advocates the consistent protection of lives and property by the proper use of standard fireproofing materials and devices so specified and so employed that the resultant structure will in itself not only be unburnable, but will serve as a protection to its contents—not a well-regulated furnace for their destruction.

THE policy of this publication is broad gauged—its scope is national. Great successes and great failures in fireproof construction in every part of the world will be discussed from a candid and unbiased standpoint. Every type of construction will be considered—office and loft buildings, factories, schools, theatres, churches, suburban homes, railroad stations, steamships and wharves—every kind of construction which should be made fireproof.

VALUABLE assistance will be given the architect in planning his building to obtain low insurance rates and consequent safety. Here the prospective building owner may learn of the latest types of successful construction—how to safeguard himself and his property against loss by fire. New legislation and building codes will be reported and discussed. Everything of interest to the manufacturer, salesman and buyer of fireproofing materials and devices will be given careful consideration.

"CONSTRUCTION" is launched with the best of connections and a thorough knowledge of its business, and invites the co-operation and support of everyone interested in consistent firesafe construction.

What One Man Has Done

*Bruce E. Loomis,
a leading exponent
of proper firesafe
construction.*

A brief outline of the work and achievements of an engineer under whose direction a consistently constructed firesafe building will be erected in every large city in the United States and Canada.



Easily the foremost individual advocate of firesafe construction in the United States is Bruce E. Loomis, head of the engineering staff of Marsh & McLennan, New York, Chicago and London, and insurance engineer of the American Bell Telephone Company. In addition, Mr. Loomis is consulting engineer for the Equitable Building Corporation, of New York, and advisory engineer for the Canadian Pacific Railway, his particular work in this last-named connection being the reconstruction of the railway's extensive system of hotels along consistently fire-resistive lines.

By virtue of his peculiar engineering and insurance training, Mr. Loomis realizes more fully perhaps than most men in his profession the urgent need that exists for safeguarding all buildings to the fullest possible degree against the fire hazard, and during the past fifteen years has supervised the construction of a large number of important commercial structures in various parts of the country along such lines; his most important achievement in this direction being the Equitable Building on lower Broadway and the Walker-Lispenard Telephone Exchange, on Walker and Lispenard streets, both of New York City. These structures—photographs of which appear on the opposite page as forming a background for Mr. Loomis' picture—embody the latest and best practices in firesafe construction, and have been studied by architects and engineers from all sections of the United States with that idea in mind. Firesafe within themselves, in so far as human ingenuity can make them, they would serve also as effectual retardants in the event of severe neighboring conflagrations, confining such disasters to restricted areas instead of permitting wholesale destruction such as might occur under other conditions. This important feature is recognized by underwriters generally who appreciate the value of such conflagration stops and would welcome their erection in every city in the country.

Following his graduation from the Lehigh University as an electrical engineer in 1896, Mr. Loomis conducted a series of electrical tests for the American Steamship Line for several years, performing notable work in this direction. He subsequently joined the staff of the New York and New Jersey Telephone Company as manager of its Staten Island department, retaining the post for several years, in which time he greatly extended the business of the corporation. His professional reputation was such at this time that a number of

prominent fire insurance companies induced Mr. Loomis in 1902 to accept the management of an association they had formed for writing street railway properties, a class of risk the fire hazard of which was then all but uninsurable.

Rooting Out Dangerous Buildings

During the progress of this work Mr. Loomis practically rebuilt many of the prominent car-barn buildings in the chief centers of the country, tearing down some altogether; cutting up others into comparatively small areas divided by fire walls, and protecting their interiors with extensive systems of automatic sprinklers, thermostatic alarms, fire doors, wire-glass windows and other approved devices for reducing the fire hazard in this important type of structures. Under his direction nearly \$2,000,000 was spent in beneficial work by the railways, one company in the Middle West appropriating \$100,000 to be spent in fire safeguards under the direction of Mr. Loomis. The net result of his five years' association with the insurance companies was to transform street railway properties from a dangerous class of risk to one that could readily be insured at far lower rates.

As insurance engineer for the American Bell Telephone Company, Mr. Loomis plans to erect for that corporation a firesafe building in every large city in the United States, remodeling present structures wherever feasible and constructing new buildings when business growth requires.

His knowledge of shipping requirements and construction has further enabled him to introduce firesafe appliances on a number of ocean and harbor vessels.

A short time ago Mr. Loomis was called to Alabama to supervise the fireproofing of a number of State buildings there. The public authorities recognized the need for safeguarding the properties to a greater degree than was hitherto deemed possible, and in casting about for engineering talent to direct the work were recommended to Mr. Loomis. Fire underwriters, appreciating both his professional and insurance knowledge, constantly consult him regarding schedule interpretations, and not a few of the requirements in present-day schedules are the result of suggestions made by him.

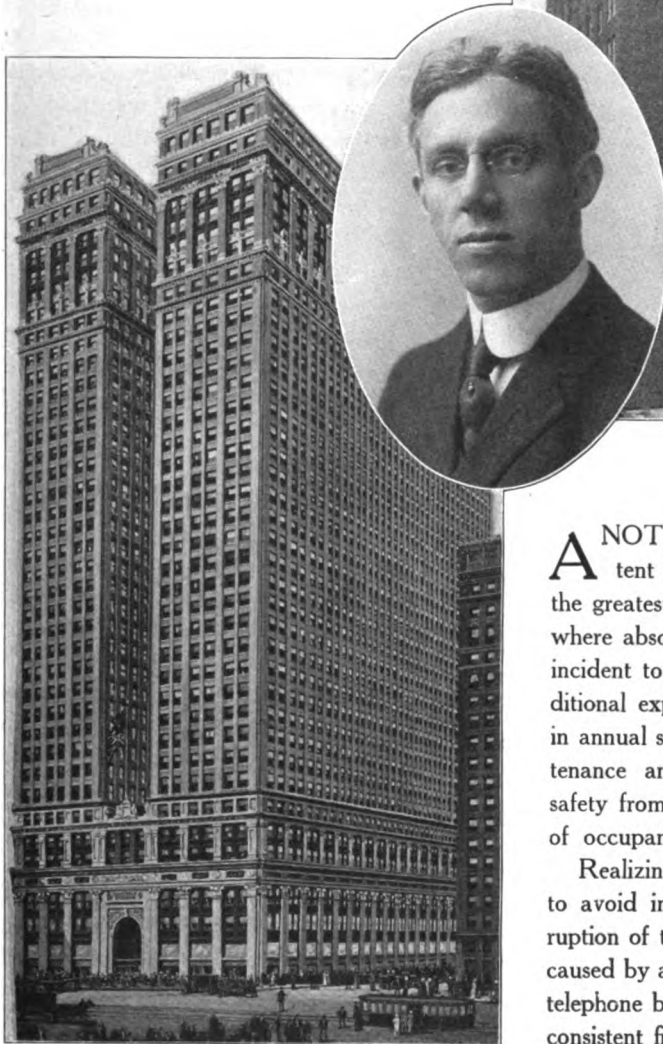
Mr. Loomis is in thorough accord with the plans and methods of "CONSTRUCTION," and this publication will from time to time present contributions from his facile pen upon matters of direct interest to its readers.

Walker-Lispemard Telephone Exchange

THE gigantic Equitable Building, located on lower Broadway, New York City, on the site of the building of the same name which was burned in 1912, is a city in itself, accommodating 15,000 tenants.

This is the finest existing example of consistent fire-resistive construction and the many lessons taught by the burning of the old structure have been applied in the new building.

A fire in any section of this building would be extinguished without alarming the tenants. Spreading of flame is impossible owing to properly placed fire-walls and thorough protection of vertical openings.



The Equitable Building

ANOTHER splendid example of consistent fireproofing. This building houses the greatest telephone exchange in the world, where absolute immunity from the disturbance incident to a fire is necessary. Here an additional expenditure of \$40,000 has resulted in annual saving of \$10,000 in cost of maintenance and insurance and insures positive safety from the fire danger for the thousands of occupants.

Realizing that it is of the utmost importance to avoid in every possible manner any interruption of telephone service such as would be caused by a fire in one of the exchanges, every telephone building is now built carefully along consistent firesafe lines.



CONSISTENT *Firesafe* CONSTRUCTION

The value to owner, architect and builder of building unburnable buildings designed to protect tenants and contents.



Introducing a series of articles dealing with the practical fireproof construction of buildings of every type, together with insurance and maintenance cost reductions.

"Construction" will discuss in detail the consistent planning and building of office buildings, apartment houses, factory and loft buildings, schools, churches, hospitals, theatres and places of public assembly, suburban homes; all buildings where the consistent use of fireproofing materials and protective devices will prove of direct value to owner, architect and builder.

The average prospective building owner, feeling that as long as he carries a sufficient amount of insurance his interests are protected, either disregards the fire hazard, to whatever extent the various building codes throughout the country will allow, or builds what he believes to be a fireproof building until, as in hundreds of cases occurring annually, fire sweeps through all or part of the building, destroying contents and endangering lives—then he counts the cost! Insurance is an excellent business proposition, but it does not pay the indirect loss—the loss incident to the disrupting of a business organization; it cannot replace or pay for lost records or lost lives.

The strength of any defense is measured at its weakest point, and herein lies the secret of absolute protection against the ravages of fire—to so plan and construct a building that by the judicious choice of unburnable materials and of protective devices, and their proper combination, there will be no weak point.

The construction of this type of building is beyond the experimental stage—it can be and is being done, as the various following issues of this publication will show.

The Value of Consistent Construction to the Owner

The fact that an unburnable building of any type is of inestimable value to owner and tenant is indisputable, but the exact far-reaching benefits of such construction are not generally realized, as the increasing annual fire loss in this country proves beyond a doubt.

Business security, particularly at this time, when businesses of every nature are becoming systematized by the keeping of accurate records, is continually endangered by fire, and depends primarily on proper building construction for its existence. Great interests, such as railroads and telephone companies, are giving recognition to this fact and building accordingly. There is no reason why the owners of business buildings and factories should not do the same.

Insurance costs in inconsistently constructed buildings constitute unnecessary charges to the owner. The Equitable Building now being constructed in New York City is an ex-

cellent example of insurance cost saving. There, by the proper choice of materials and protective devices, and by consistent insurance engineering—the proper subdivision of fire areas and protection of vertical openings—the insurance cost has been reduced to less than half that of surrounding buildings of less height and area, and termed fireproof.

In the Walker and Lispenard Street Telephone Exchange in New York City an expenditure of an additional \$40,000 in the construction has resulted in a saving of \$10,000 every year in premiums and maintenance, and has housed a business where immunity from disturbance is absolutely essential in a building wherein such immunity is positive.

The cost of maintenance in this type of building is undoubtedly reduced. Proper fireproof construction necessitates the use of metal trim, doors and window sash on which the enamel does away with the cost of repainting. On every hand is solid, unwearing construction. The rental income from such a building is greater and its advantages are apparent to any prospective tenant.

In the matter of schools, churches, theatres, hospitals and places of public assembly consistent construction becomes a duty to public welfare. There is no longer any excuse for the horrible fires which frequently shock the American public.

Comment on proper fire protection in the home is needless. Consistently fireproof houses rent and sell better than cheaper inflammable structures, and the demand is growing rapidly. The American public is slowly awakening to a realization of the great burden imposed by the fire tax!

From the Standpoint of the Architect

To combine usefulness with beauty is the aim of every good architect, and the great field opened up by insurance engineering offers him a splendid opportunity to increase the value of his services to prospective building owners. The first questions which he will ask are: Does consistent fireproofing in any way interfere with an imposing and attractive design; and, will it greatly increase the original cost of construction? To both questions the answer is—No! Detailed proof of this statement will be given in the various issues of CONSTRUCTION.

All the statements made to owners in the preceding pages constitute strong arguments for the architect. He can point with pride to the results of his work—to attractive indestructible buildings insuring the safety of life and property—every building a tribute to his ability.

Consistent firesafe construction means satisfied clients and a growing volume of business for the architect.

Municipalities and Communities

The direct value of consistent construction to municipalities and communities needs little discussion. In the first place, it lessens and finally does away with that greatest of all fire hazards—the conflagration. Unburnable buildings constitute excellent fire stops. A few of such buildings close to the origin of the Salem fire would in all probability have held the flames in check until they could have been controlled.

The element of indirect loss enters strongly into the conflagration question. Every great conflagration in this country has resulted in the loss of established manufacturing to the community involved, either because they never resume business or because they are induced to locate elsewhere. Boards of Trade and similar organizations have been made unpleasantly aware of existence of this condition.

Again, our children must be protected in the schools, our sick in the hospitals, our families in places of public assembly.

Absolute immunity from fire loss is of direct material benefit to all, but particularly so to those who plan and own buildings. Our annual fire loss of a quarter of a billion dollars is an unnecessary burden—an economic loss which must be borne by them. The root of the evil is inconsistent construction. *Build so it cannot burn!*



Frame Construction Must Go

Happily the War Department officials at Washington fully recognize the danger of longer maintaining wooden buildings at the different army posts throughout the country and plan for their replacement by structures of concrete, brick, stone or other permanent type, as rapidly as appropriations for such work become available.

Once the changed conditions come about, a recurrence of such a serious happening as was reported several weeks ago, when the wife of Brig.-Gen. J. J. Pershing and three of their children were suffocated in the fire that destroyed their quarters at the Presidio, San Francisco, will, fortunately, be impossible. That such an event could have taken place at an army post, where a thousand or more men are on duty, and where constant vigilance is the keynote of safety, is an awful arraignment of wooden construction and should forever bar the use of the product in buildings housing human beings. Not the alertness of the soldiers or the prompt use of the local fire-fighting facilities were sufficient to check the spread of the flames, which swept through the building like a blast furnace, suffocating the sleeping inmates and precluding all chance of their escape.

According to a communication sent to CONSTRUCTION by the War Department, "buildings constructed for use as officers' quarters are of four general types, namely: concrete, brick, stone and frame. At the more modern posts, such as Fort Winfield Scott, Cal.; Fort Sill, Okla., and Fort Benj, Harrison, Ind., it had been the policy of the War Department to provide permanent buildings of concrete, brick, or stone construction, depending on the locality of the post. At a number of the older posts these buildings have been constructed of frame and are gradually being displaced by modern brick or concrete buildings, or other permanent construction, as appropriations become available."

The quarters occupied by the family of Gen. Pershing were "built of frame, with modern improvements, like the majority of the buildings erected in the residential section of San Francisco."



Increased Protection for Atlantic City

Warned by the serious fire of August 21 last, when property valued at over \$100,000 was destroyed, the authorities at Atlantic City, N. J., have arranged for a supplementary high-pressure water main costing approximately \$90,000. The supply main will extend from Massachusetts avenue down to Missouri avenue, and will be about 20 inches in diameter. Side avenue extension mains will be placed on Arkansas, Kentucky, South Carolina and Virginia streets from Pacific to the Board Walk. Pressure for this main will be supplied by hotel boiler-rooms along the ocean front until such time as a central pumping station can be built.

In addition the city will buy new fire apparatus, the authorities realizing the seriousness of the local fire hazard and being determined to do all within their power to safeguard against it.



Building Projects Planned

Upon the site of the old Paterson (N. J.) Opera House a motion picture theater, seating 1,650 persons, will be erected. It is to be of modern fireproof construction, and will cost \$50,000.

A modern \$300,000 hotel is planned to replace the famous Bancroft House at Saginaw, Mich.

At a cost of \$20,000 the Vacuum Oil Company, of Rochester, N. Y., plans a brick addition to its present plant.

Two hundred and fifty thousand dollars will be spent by the Haynes Automobile Company in extensions to its plant at Kokomo, Ind. The intended structure will be of steel and concrete.



Segregating Film Studios

Because of their fire hazard it is suggested by Fire Commissioner Adamson, of New York City, to confine all film company studios to locations along the water front.

Your Co-operation

CONSTRUCTION aims not only to be of general interest to its readers, but proposes to be of positive service as well, and no effort, time, or expense will be spared in the attainment of that object.

The publishers realize, however, that the magazine's usefulness will be increased just in proportion as it receives the close and constant co-operation of architects, contractors, manufacturers, underwriters, municipal officers and the ever-growing number of propertyowners interested in reducing the enormous fire waste of the country, through the most practical means—i. e., the erection of unburnable buildings. The support of all such is earnestly sought.

While CONSTRUCTION has upon its staff writers especially familiar with building practices and problems, and can rely upon some of the foremost engineers of the land for advice upon highly technical matters, the field of fireproof construction is so vast, and the questions entering into it so numerous and diverse, as to make a number of counselors desirable, and we hope to count upon many in this capacity.

Communications upon any phase, direct or indirect, of building construction, material, methods or results, will be gladly received, and accorded proper space in the columns of this publication.

SPECIAL DEPARTMENTS

As a glance through the pages of the present number will disclose, a series of departments for the presentation of matter relating to different spheres of activity has been arranged, and this form will be followed in future numbers of CONSTRUCTION, subjects of broad concern, of course, appearing in the forward pages.

As now constituted, special departments have been decided upon as here quoted: "Building Laws and Ordinances," "Court Decisions," "Fire Service," "Financial," "Insurance Viewpoint," "Proposed Buildings," "Protection," "Testing Materials and Devices" and "The Manufacturer." Others will be added as their need becomes apparent, the intent of the publishers being to not alone cover the entire field of consistent firesafe construction, but to so classify the matter as to enable each reader to readily turn to that department which most concerns him.

Building Laws and Ordinances

Under this heading will be recorded whatever new statutes or amendments to old laws, affecting the building or building material manufacturing industry, may be enacted from month to month by the different State Legislatures, together with illuminating comment thereupon wherever such comment seems advisable.

Municipal ordinances, and particularly the adoption of modernized codes by cities and towns, will be noted, so that progress in this desirable respect may be faithfully followed.

The power of example in this world cannot be overesti-

mated, and it is not extravagant to predict that, as time progresses, numerous communities may be induced to prepare advanced building codes through learning in CONSTRUCTION of what others have done in this important respect.

Decisions and rulings by courts of competent jurisdiction upon cases affecting the building industry and those related thereto will be critically prepared and given a place in this department. It is suggested that manufacturers and others carefully preserve this as well as other sections of the magazine for future reference; the cases dealt with perhaps being the means of inducing action contrary to what would otherwise be taken, thereby avoiding trouble and possibly heavy financial loss.

Financial

The manufacture of building material and furnishings constitutes an industry of great importance in the United States and many millions of dollars are invested therein. The securities of numerous steel, wire, brick, cement and kindred lines are listed upon the stock market of the various cities, and their fluctuations are closely watched by investors everywhere. In its Financial Department CONSTRUCTION will give the prices recorded each week upon all listed securities at the time of the magazine's going to press. The particular activities of different stocks and the reasons therefor will be pointed out, as will also dividend payments, new issues of shares and the general trend of the industrial financial market.

Inquiries affecting any of the securities will be given close attention and when the information asked for by correspondents is obtainable it will be cheerfully furnished.

Insurance Viewpoint

Fire underwriters are vitally concerned in inducing a better type of building construction, and through their various associations are doing all they can to bring about such result. Under the advanced rating schedules allowance is made for the use of fire resistant material in building erection, while penalties are imposed for the adoption of material or practices that will tend to increase the fire hazard. The attitude of the underwriter toward building problems is of pronounced importance to the building trade, and such attitude will be chronicled in this department.

Proposed Buildings

The value to architects, contractors and manufacturers of having early and accurate knowledge of proposed large building ventures will be readily apparent, and information of this character will constitute a feature of each successive number of CONSTRUCTION. Minor projects, of course, will be ignored, attention only being given to those calling for the expenditure of considerable sums of money, and the use of fire-resisting or fire-retarding material. At present an unusually large number of school and college buildings

(Continued on page 53)

*The Development of
Structural Iron, Steel and Fireproofing
and the
Fire-Resistive Uses of Metal
in Building Construction*

BY
WM. WALLACE EWING
M. Am. Soc. C. E.
M. Am. Soc. for Testing
Materials

ARTICLE I

The early stages
of large building
construction, fire-
proof flooring
and the protection
of metal members

reasons for this practice, the first section of this article will consist of a brief outline of the development of the use of iron and steel in the structural framework of buildings and the art of protecting metal members against fire. In following issues, present practice in structural metal protection, fireproof floor construction and the use of metal doors, trim and furniture will be carefully described.

In 1881, in Chicago, the first modern office building, the Montauk, was constructed using heavy masonry piers and hollow-tile floors of spans from 3 to 4 feet.

In the year 1883, in the same city, the Home Insurance Building, designed by W. L. B. Jenney, was built with skeleton construction—a most radical departure from previous practice and a natural answer to the demand for higher buildings owing to a strong tendency toward centralization of business interests and advancing real-estate values.

In this building, iron columns were placed in each pier for the purpose of carrying floor loads and relieving the pier, thus creating exterior walls which were practically self-supporting, and so doing away with the massive masonry piers which had heretofore been deemed necessary for the support of walls and partial floor panels.

As the skeleton type of construction developed, it was soon realized that the erection of large buildings was impossible unless proper means of fireproofing metal structural members were employed.

In 1874 the first terra cotta fireproofing had been applied to columns of cruciform section in the form of porous terra cotta gores, each section being 1 foot in length and secured

MUCH might be written, from a historical standpoint, of the gradual development of the use of iron and steel in building construction; but definite interest in this subject is directed to the period extending from the early eighties to the present time.

In order to show clearly not only present practice in the use and fireproofing of metal in building construction, but the

to the metal by screws tapped in to the column flanges, metal washers being placed at joint intersections and all covered with a plaster or cement coating. The first application was made in the construction of the Chicago Club House Building.

After a realization of the absolute necessity of fireproofing the metal members in the new type skeleton construction, the use of terra-cotta for this purpose became general and the various forms of hollow, webbed blocks were developed.

Another early form of column fireproofing was that of placing an additional iron shell around cast-iron columns. This type of fireproofing was patented and called for in the New York building laws at that time. At first the space between these shells was filled with plaster, but as this was affected by damp weather the filling was subsequently discarded and air space left. This fireproofing, though used to a considerable extent, rapidly proved its inadequacy and was discarded in favor of hollow tile and cement.

Testing Unprotected Metal

In order to show clearly the harmful effect of fire on unprotected metal members, a committee on fireproofing tests, supported jointly by the Tariff Association of New York, the Architectural League of New York, and the American Society of Mechanical Engineers, carried out a series of fire tests on metal columns in the yards of the Continental Iron Works, Brooklyn, N. Y., during the summer of the year 1896.

The first test was made on a steel box channel under a load of 46 tons, heated rapidly to 1,200 degrees in a brick kiln. The column buckled near the center sufficiently to have caused collapse.

The second test was on a steel Z-bar, under a load of 84 tons and heated slowly to 1,100 degrees. This column bent slowly along its entire length.

The next test was made under similar conditions on a round hollow cast-iron column, with flanges faced on both ends. This column had been cast horizontally with a dry sand core. The load was 84 ³/₁₀ tons and the column was heated to a temperature of 1,100 degrees. The column bent gradually. Another test was then made of a similar

column under the same load and heated to a temperature of 1550 degrees. The column broke cleanly across the center.

The Development of Fireproof Flooring

The development in the construction of fireproof floors was both rapid and interesting.

The first type of unburnable floor construction was that of brick arches between unprotected iron I-beams. This construction was naturally very heavy and created excessive dead loads.

Following this came the idea of a bent corrugated metal arch, with a lean concrete fill above to the floor level. This was used in a number of buildings and fire tests quickly proved that it was useless, in that the metal under stress and heat rapidly distorted and caused floor collapse.

The next development, and one widely used, particularly in the construction of factories and warehouses, which must necessarily have floors of heavy load-carrying capacity, was the so-called buckle-plate flooring, which consisted of heavy cast or wrought-iron plates dished upwards and topped off with concrete and cement flooring. These plates rested on the beams, which were closely set and proved fairly satisfactory, although the cost was high, until severe fires proved that the expansion and distortion of beams and plates, together with their great weight, caused severe floor failures.

The problem which then faced architect and builder was to find a type of flooring which would be not only fireproof but of light construction capable of bearing heavy loads. Even then, the fireproofing idea was entirely secondary to that of finding a satisfactory flooring of considerably less dead weight than those used heretofore. The solution of the problem proved to be terra-cotta.

Flat hollow-tile arches were first manufactured by Mr. George H. Johnson in Chicago in 1872, and were used in conjunction with iron I-beams in the Kendall (Old Equitable) Building in that city. These blocks were not webbed, but consisted of single cells set in flat arch form.

In 1877 the Chicago City Hall was built, using terra cotta arches with flat bottom and curved top filled level with concrete, while at about the same time a similar but heavier type of arch was introduced in the corridor floors of the New York Post Office and in the floors of the Coal and Iron Exchange Building on Cortlandt street in New York City.

After a limited use of single-cell terra cotta blocks in floor arches it was found that these were not strong enough for the purpose and a new type of block, the first webbed terra cotta floor block, was introduced by the Johnson Company and used in the construction of the Mutual Life Insurance Building on Nassau street, in New York City, and in the Home Insurance Building in Chicago. Here also soffit tiles, for the protection of the lower side of beams, were first used. Heretofore the terra cotta blocks had been fitted in various ways against the sides of the beams, leaving the lower flanges unprotected. It was found that this unprotected metal was always colder than that under protection, which caused a condensation of moisture at this point, thus causing collections of dust and soot on the ceiling beneath the beam in the

shape of long discolored lines. To do away with this unsightly condition the soffit tile was introduced without a realization of its added protection to the beam from a fireproofing standpoint.

As the terra cotta blocks were strengthened by new forms of webbing and moulding, the construction of floor arches was gradually lengthened until in the Commerce Building in Chicago the long-span segmental arch was put into use for the first time, 16 feet between beams.

Fires in "Fireproof" Buildings and Their Effect on the Development of Proper Practice

In 1891 a fire occurred in the Lumber Exchange Building in Minneapolis which constituted the first good test of the new idea of fireproof construction. This building consisted of an old section of nine stories of iron column and girder construction with wood joists, all members being covered with terra cotta. To this were added two new stories above and an annex of eleven stories, built after the best practice of the times, steel frame, protected by terra cotta, and 7-foot terra cotta floor arches.

The result of this fire proved of great interest. In the old building, where the fire burned fiercely for twenty-four hours, the protected iron structural members stood alone. In the old section the iron framework supported perfectly the two new stories above, which, owing to improved floor construction, were practically undamaged by the fierce flames beneath. The structural members of the new annex were practically undamaged, but fire swept through the building, feeding on wood which had been used in the construction.

An interesting test of fireproofing occurred in Chicago in November, 1892, when the unfinished building of the Chicago Athletic Club was burned. This was a nine-story building having a steel frame of Z-bar columns and I-beams with self-supporting exterior walls. A large amount of wood was used for trim and wainscoting. Before this building was finished it was completely gutted by fire and furnished several valuable lessons in the art of proper fire protection. The structural work was complete and interior trim and decorating was being done at the time of the fire. In a number of rooms wooden trim was piled in great quantities and served to feed the flames to a fierce heat.

In the application of the terra cotta fireproofing to columns a grave error was made by the insertion of wooden nailing strips between terra cotta blocks. Fire swept up through the building, feeding on the wood trim and floors, and eating out the nailing strips in the fireproofing, causing the sections of terra cotta to loosen and fall off, thus exposing the columns. The protected structural metal members withstood the flames in a remarkable manner, thus proving the value of fireproofing. All failures in this fire were due to inconsistent construction, such as the use of wood floor coverings, the insertion of wood nailing strips between sections of the column fireproofing and the failure to properly wedge terra cotta block partitions for the purpose of making them rigid enough to stand the pressure from fire-hose streams.

In August, 1892, the Metropolitan Opera House, New York City, was burned. This was probably the first theatre ever constructed along supposedly fire-resisting lines. Following are interesting points:

The floor construction, for the most part of terra cotta arches, withstood the fire.

A large amount of unprotected iron work around the stage failed entirely.

The large proscenium arch girder, protected by terra-cotta fireproofing, was unharmed.

Great quantities of scenery and other inflammable material on and near the stage fed the flames to a terrific heat.

The asbestos drop-curtain proved useless because it did not work automatically.

The terrible Iroquois Theatre fire in Chicago, 1903, which caused the death of over 560 persons, is excellently commented on by Joseph Kendall Freitag in "Fire Prevention and Fire Protection" (Wiley & Sons, New York City).

"It demonstrated that construction bears little relation to the possible loss of life, unless the construction is supplemented by fire-preventive design and precautions and by fire-protective appliances and devices. This is not to say that the construction should be anything but the most approved fire-resisting type, but that, in this class of building more than any other, safeguard or proper design and equipment *must* supplement to the fullest degree even the best construction."

This means *consistency* in the use of fireproofing materials and devices.

In 1898 the Home Life Insurance Building, New York City, was badly damaged by a fire which started in an adjoining five-story building. The fire entered through and above the eighth floor windows in a shaft in the north wall. Here the protected structural members were saved, and wood trim, doors and window frames in walls and partitions, together with a lack of shutter protection against an adjoining hazard, were responsible for the damage.

The heat of a fire near the Manhattan Savings Bank Building, New York City, acted on exposed iron work, the unprotected ends of beams and girders expanding and causing great damage.

The fallacy of constructing a building in such a manner as to make access to a fire difficult was demonstrated by the Vanderbilt Building fire in New York City, 1898. Here fire started in an adjoining building, and as the iron shutters of the Vanderbilt Building were open the fire broke through the windows and gutted many offices. Great difficulty was experienced in approaching to fight this fire, owing to the narrow, crooked stairway.

On January 9, 1912, on the same site now occupied by the finest example of consistent fire-resistive construction in the world—the Equitable Building—the old building of the same name was completely gutted by fire. This building consisted of five buildings joined together at various times and naturally contained many different structural and fireproofing features. Here, after the fire, were found unprotected cast-iron columns broken completely and allowing a collapse of a large section of the structure; wrought-iron columns crumpled and distorted—on every hand destruction of unprotected structural members. An interesting comparison is that of the tests on unprotected metal members and the actual working out of these same tests under natural conditions.

Thus the "fireproof" buildings have burned, teaching many valuable lessons. Consistency in the use of fireproofing materials and devices is absolutely necessary.

One of the great lessons learned through the years of development is clearly that any material to fully fireproof metal structural members must be non-heat conducting, indestructible by fire, securely applied to and adequately covering every part of each member. The next article of this series, to appear in the November issue of CONSTRUCTION, will deal with present practice, by which the ideal fireproofing method is being attained by using cement, terra cotta and brick.



In face of the fact that \$115,000,000 is being paid by insurance companies in a year for actual losses resulting from inferior construction, is it a wonder that fire protection engineers are a unit in condemning inflammable buildings?

RECENT CONTRACT AWARDS

Among other contracts recently awarded for the erection of buildings in which fire-safe material will be employed are the following:

Amsterdam, N. Y. Shuttleworth Brothers Company. Mill, six stories, 243 x 62, of flat slab type of construction. Also a dye house, six stories, 170 x 54, of beam and girder type. Both structures to be of reinforced construction, with brick curtain walls, double glazed windows and wood floors. F. P. Sheldon & Son, Providence, R. I.,

architects and engineers. The Turner Construction Company, Buffalo and New York city, contractors.

Marion, Ohio. The Burrell Engineering & Construction Company, Chicago, is erecting the reinforced steel plant of the Marion National Mill Company.

Lambertville, N. J. To Fred R. Parker, of Trenton, has been awarded the contract for building a nine-room addition to the third ward school.

Hoboken, N. J. The Rockwood Sprinkler Company, Worcester, was successful in securing the sprinkler equipment contract for the Hoboken Land & Improvement Company's building at 15th and Bloomfield streets, its figure being \$15,600.

President Snow, of the Home Insurance Company of New York, says: "It is a safe and sober statement that half the annual fire loss in this country (which in 1915 amounted to \$300,000,000) would be saved by the use of incombustible materials for walls and roofs and by substantial chimneys and safe-heating arrangements."



The Editor's Page

*IN the busy hours of every day
We pause—
To analyze and weigh
A striking word, or deed, or
thought.*

Personal Liability for Fire Loss

HOLDING every fire to be a crime, deserving of severe punishment, the National Fire Protection Association is actively and intelligently campaigning to make its slogan effective. It has already secured the introduction into the legislatures of Connecticut, Illinois, Kansas, and a number of other States, of bills holding parties personally liable for damages resulting from fires originating upon premises occupied by them. While public sentiment has not yet progressed to a point that will insure the enactment of the measures, yet the idea is steadily gaining in favor, and it is a fair assumption that within a few years such proposed legislation will be found upon the statute books of every commonwealth in the land.

The form of legislation suggested by the National Fire Protection Association in this connection is here given:

SECTION 1. Any person, persons or corporation for any fire caused by, resulting from, or spreading by reason of [the negligence of such person, persons or corporation or] the non-compliance with any law or ordinance or lawful regulation or requirement of or by any state or municipal authority, shall be liable: (1) for all loss, expense or damage caused by or resulting from such [negligence or] non-compliance; and (2) for any expense incurred by any municipal or other governmental agency in extinguishing or attempting to extinguish any fire so caused, resulting or spreading.

SECTION 2. In all actions against any person, company or corporation for the recovery of damages on account of any loss or injury to any property, real or personal, occasioned by fire communicated from property owned by one party to property owned by another party, the fact that such fire was so communicated shall be sufficient evidence to charge the occupant of the property in which the fire originated with negligence, and place the burden of proof upon him.

SECTION 3. This act shall take effect

The comparative immunity of European cities from fire is well known, though the fact that such immunity is largely due to stringent laws bearing upon the subject and the vigorous manner of their enforcement, is not so generally appreciated.

While a fire in the United States is frequently looked upon as an unadulterated blessing, and the individual sustaining it—providing he be well insured—is an object for congratulation by his neighbors, in France and Germany the reverse holds true, the fire and all circumstances attending it being a subject for close investigation. Unless the unfortunate property owner can convince the authorities that the fire was of purely accidental origin, and that every available means at hand were employed for its extinguishment, he must not only stand his own loss, but also any that may have been caused to neighboring property. In addition, he is liable under certain circumstances to a jail sentence. He is made to appreciate that a fire is a crime, and not a fortunate happening from a business standpoint.

Through careless building practices, loose inspections or no inspections at all, properties in this country are allowed to get into a condition that practically invites fire, with the result that communities are put to very heavy expense in maintaining fire departments, while individuals must pay fire insurance rates many times what they would be charged if due care were exercised in safeguarding against property loss.

Two years ago the Fire Commissioner of New York City secured the passage of a local ordinance requiring all mercantile buildings of a certain type to be equipped with automatic sprinklers as a protection against the spread of flames. While the enforcement of the measure created a great furor, its constitutionality was upheld by the courts, and two concerns were forced to pay upwards of \$1,500 each for failing to comply with its terms. A like ordinance is now in force in Chicago, which has added not a little to the reduction of the fire menace in that city.

Every right-thinking citizen must do all that lies within his power to encourage beneficial legislation of this kind, realizing that in the immunity of his neighborhood from the dangers of carelessly started fires lies his own safety.

Analyzing a Fire Loss

Few persons ever stop to analyze carefully the widespread and almost unbelievable loss which a single fire causes. A glance of passing interest at a headline in one's newspaper, "Factory Building Destroyed, Loss \$200,000," and the average mind passes on to other news items.

Have you ever paused for reflection on this topic? Did it ever occur to you that the loss of \$200,000 was an unreplaceable economic loss which would travel on and on, passed from one to another, disguised, it is true, but still a fire loss? Perhaps you doubt this statement. A careful consideration of this subject may prove a surprise and give added weight to the advice—*Build consistent firesafe buildings.*

In this factory fire, where the loss was \$200,000, let us assume that the plant was practically destroyed.

To the world and to the country, State and city in which this manufacturing plant was located, the factory constituted one of the many units which are constantly busy producing natural wealth—making something useful out of raw materials by the application of labor and the artisans' skill. Production by this unit has been stopped for many months to come by the fire—the world, the country, the state and city are losers!

Again, this unit was a buyer of raw material—one that supported prices by the application of its atom to the great law of supply and demand. The sellers of raw material lose!

The worker, too, must help bear the burden of indirect fire loss. The payroll is cut off—he may be idle for months, his landlord, grocer, butcher, all lose—the great ranks of the unemployed are strengthened—an infinitesimal downward push has been given to society!

The factory owner loses. Insurance? Certainly. But think of the indirect loss to him—the loss of time, of profits, of valuable records and business system—all losses which, as our Irish friends might say, can only be replaced by not having them!

The municipality suffered heavily. Water and fire fighting

costs add up rapidly, and here is property rendered almost untaxable! Then, too, diverging from the subject, this fire was a potential conflagration. The great Salem fire, with its loss of \$14,000,000, started in a shoe factory!

So the loss goes on and on. Unlike energy, which is used up only to be changed in form, an economic loss can *never* be replaced. That *creation* of man's *ingenuity and labor* on which a certain amount of energy was expended, is gone forever. Newly created natural wealth must take its place. Truly, the fire loss is a draining and wasting of the vital forces of a nation and a quarter of a billion dollars money loss suffered annually by the United States constitutes a staggering, indirect loss—too great for the most comprehensive mind to grasp.

—and the Remodeled Edison Buildings Are Consistently Constructed

Neither Brick Nor Concrete Failed in this Fire

Consistency in fireproof building construction is the great lesson taught by the widely discussed Edison fire. In spite of many assertions to the contrary, neither concrete nor brick failed.

There are two distinct types of good firesafe construction and no man can fairly say that one is better than the other. These are reinforced concrete beam and girder with concrete floor arches and columns, which is a type of building particularly favored for warehouses and manufacturing plants where heavy floor-loads are carried; and brick and steel (protected by terra-cotta fireproofing and furring) with terra cotta or concrete floor arches, this type being particularly adapted for the construction of office and other lofty buildings.

In the terrific heat generated in the Edison buildings concrete construction passed creditably through a most severe test, and the brick walls that collapsed formed part of a building which was so inconsistently constructed, from a fireproofing standpoint, that its walls if built in the same manner with any other material would have failed. *The fault lay in the method of construction, not in the choice of material used.* The sum and substance of the results of all investigations is plainly evidenced by the reconstruction of these buildings in a consistent manner.

Mr. Edison, one of the greatest of modern thinkers, deserves credit in that, although before the fire he did not realize or admit the value of consistency in building construction, he now profits by the lesson well learned.

Less than a year ago the Edison moving-picture studio at Fordham, N. Y., was gutted by fire. The building was of fireproof construction, but lack of firedoors and improper care of the automatic sprinkler installation allowed the rapid spread of a fire which started almost under the watchman's eyes.

What a sense of satisfaction must come to the man who, having read of a fire loss due to inconsistent construction, can go out into his own great mills or factories and see on every hand plain evidences of safety against the fire hazard—strongly built fireproof walls and floors—window openings protected by wire-glass in steel sash and frames—vertical openings, such as elevator shafts and interior fire-escapes surrounded by fireproof walls equipped with fire-doors—large areas divided by fire walls and protected by automatic sprinklers—alarm and supervisory systems which not only give the alarm of fire, but keep a careful check on sprinklers and water-tanks—chemical extinguishers for quickly putting out incipient blazes—everywhere proper safeguards—nowhere means of entrance for fire or an opportunity for it to spread!

It is indeed strange that men of great ability pay so little attention to the question of housing their business in a safe and proper manner, but the time is rapidly approaching when this subject will be of vital interest to all, and then only will the burden of the fire-tax lighten on the shoulders of the American people.

Contrasting frame and safe construction on an equal length of time, it has been found that frame buildings lessen in value three times more than safe buildings.

The average depreciation on masonry dwellings is less than five per cent. This depreciation means a permanent exhaustion of values, not a market decline.

Talks to Wide-Awake Business Men

Common Sense Reasons Why This Publication Should Advance Your Business

CONSTRUCTION is published to prove and promote the economy, safety and efficiency of the *consistent* type of fireproof building—to advance which there exists a very definite need for intelligent national publicity reaching every interest and class related to fireproofing. This most logical method of building has never before had a magazine exclusively devoted to its advocacy and explanation.

New York City, as an example, is regarded by the average mind as being largely composed of fireproof buildings. It contains considerably less than a dozen which are consistently firesafe, by which is meant a structure like the new Equitable Building in which a fire may be started at any part and the blaze will be automatically extinguished at the point of origin. In other words, it is confidently asserted by most distinguished engineering authorities that this building cannot be destroyed by fire.

As for the rest of the City, with very few exceptions, its fire history shows that the only fireproof parts of the great majority of its buildings are the walls. We build *them* fireproof, then turn round and commit ourselves to the gross inconsistency of installing wooden window frames, doors, floors, trim, partitions, and often inflammable roofs.

And New York City is but an illustration of the conditions generally existing throughout the United States.

Proper fireproofing has been a matter of evolution. It is a young industry whose history dates back less than a decade. Its coming record will be one of incalculable conservation and service. In advertising language it is a wonderful "field" which until the advent of CONSTRUCTION remained uninvaded.

We used to think that a building with fireproof walls was a "fire-proof" building. Now we begin to observe such logical refinements as metal window frames, doors, trim, partitions, furniture, ceilings, etc.—unburnable floors—sprinkler systems—the many devices of proven merit which eliminate the fire hazard—roofs that cannot burn—the matter of scientifically subdividing large areas—of protecting elevator shafts and other vertical openings—standard tests to determine whether or not a material or device is really impervious to the action of fire—laws, codes and insurance enactments and regulations which in an ever increasing degree shall bring about consistent firesafe building.

Everything which in any way relates to consistent fireproofing will be properly treated in the pages of CONSTRUCTION, which is produced to bring about *a wider national knowledge of the superior structural and protective excellencies of all that is used to erect, equip, maintain and protect consistent firesafe building.*

As there exist no reasonable arguments in favor of housing human beings in homes, offices or factories built of the material used to start kitchen fires, so there are no sound arguments against consistent firesafe building construction.

¶ It is the *logical* way to build.

¶ It is the *economical* way.

¶ It is the *only safe* way.

If you manufacture any material or device used to erect, maintain, safeguard or equip consistently constructed firesafe buildings, CONSTRUCTION'S pages offer a meritorious medium for extending the knowledge and sale of your products.

If you are an architect, engineer or contractor believing in consistent fireproofing, CONSTRUCTION will carry your message of service to the proper audience.

If you are an executive, prospective builder, or one interested in any angle of the subject of real fire safety, CONSTRUCTION will keep you intelligently informed regarding all legislation, state and local law decisions, building codes, insurance regulations, association activities, the purpose and use of new materials and devices, the latest tests and engineering achievements in fireproof construction, etc., etc., etc.

CONSTRUCTION'S pages are not filled with a miscellaneous assortment of copied matter, reviews or re-writes. They contain the results of careful, painstaking, authenticated technical learning and achievement in the field of proper fireproofing.

Each issue reaches not less than 6,100 of none other than the *leading* professional and business interests throughout the country, actively engaged in the construction of office buildings, factories, schools, churches, homes, etc.—an intelligent, experienced, progressive and successful audience.

CONSTRUCTION is a permanent, nation-wide effort to give publicity to the goods you manufacture or the service you render.

Inquiries regarding every phase of publicity and advertising are solicited and will receive prompt attention.



Publicity Manager.

October, 1915.

America's First National Exposition of Chemical Industries

As CONSTRUCTION goes to press, announcement is made of the First National Exposition of Chemical Industries, to be held during the week of September 20 at the Grand Central Palace, New York City, under the management of the International Exposition Company.

Such an undertaking is of paramount importance, and in every way is deserving of the hearty support of all those interests related to industrial chemistry and its great service to our every-day life and activities.

Turin, Stuttgart, Berlin and other European cities have held expositions of chemical industries, and though the first expositions of this nature, held in London in 1911, and again in 1913, were very limited in scope, they met with gratifying success.

No more propitious time than the present could have been chosen for America's first national chemical exposition. We have needed one in the past. It is needed now more than ever before. And when the movement for an exposition was started men realized present conditions, and the idea met with unparalleled acceptance and enthusiasm, both from the professions and the industries.

At no time has the mind of the country been more interested in all that relates to industrial chemistry. It is the "psychological moment" for manufacturers of everything that has to do with the chemical industry to get together and show the American public the great array of chemicals, appliances, methods and results which can be procured right here in our own land. The broadening influence of such united work must prove of decided benefit to all concerned. It is expected the Exposition will attract a record attendance from all over the country.

No better place than the Grand Central Palace could have been secured. It is a new structure of mammoth proportions, costing \$3,000,000, and built especially for exposition purposes. The main hall has an exhibit space of 23,000 square feet, and lends itself wonderfully for display purposes. Unusually broad halls and corridors make for comfort and safety in handling large crowds.

Object

Industries have always expanded in a measure equal to their publicity, which is the keynote to attract attention and new business to the American chemical industries. To bring into closer contact than ever before the manufacturers, financiers, dealers and consumers, and at the same time to bring to the favorable attention of the general public the newer processes, apparatus and products, this is the meritorious object of the Exposition.

New York City is the business center of the American chemical industry. It is the banking and also the shipping center, and with its great permanent population, and almost as great host of transient visitors, readily presents itself as the ideal location for the first exposition of chemical industries in America.

Exhibits

The elaborate exhibits and displays of which the exposition will consist will embrace American chemical products,

apparatus and processes, showing how intimately related to our daily life are the chemical industries.

Working Exhibits

Working exhibits will be in continuous operation while the exposition hall is open, giving visitors ample opportunity of seeing for the first time the processes or apparatus in actual work.

Meetings

A convention hall will be devoted to meetings of the various chemical societies, to lectures and lantern slides and motion picture exhibits to which the public will be invited. Programmes of special events will be announced daily.

Publicity

This Exposition will be advertised very extensively, and will receive more publicity throughout the country than any other exposition ever held, and will result in being one of the best advertising and selling agencies the exhibitors could possibly consider. Manufacturers will reach and talk personally to more people directly interested in chemistry and chemical engineering at this Exposition than they could possibly reach at one time by any other method.

The Programme

The preliminary programme for the National Exposition of Chemical Industries has been exceedingly well arranged to adequately cover the main points of interest to the various industrial bodies and professions represented.

Monday, September 20

Opening day.

Tuesday, September 21

Howard Gross, President, Tariff Commission League. "Tariff Question."

Linn Bradley, The Research Corporation. "Solution of Smoke, Dust and Fume Nuisance by Electrical Precipitation."

D. T. Pierce, Barber Asphalt Company. "Asphalt" and "The Brownian Movements of the Colloids of Trinidad Asphalt."

Harrington Emerson, The Emerson Company. "Efficiency in the Conservation of Our Natural Resources."

MEETING OF THE NEW YORK SECTION OF AMERICAN ELECTROCHEMICAL SOCIETY

Wednesday, September 22

Frederick W. Keough, National Association of Manufacturers. "Accident Prevention in the Chemical Industries."

Welding Ring, President, American Exporters' Association. "Transportation and Shipping Facilities with Foreign Countries."

J. L. Lightner, Hershey Chocolate Company. "The Manufacture of Chocolate."

Dr. Thomas H. Norton, Department of Commerce. "Foreign Markets for American Chemicals."

I. F. Stone, President, National Aniline & Chemical Company. "The Aniline Dye Situation."

Thursday, September 23

J. L. Taylor, Bureau of Explosives. "Explosives."

H. A. Huston, German Kali Works. "Potash."

G. B. Heckel, New Jersey Zinc Company. "Paint."

Robert L. Frink, President, Frink Pyrometer Company. "The Relation of Chemistry and Mechanical Manipulation to the Evolution of the Glass Industry."

Charles V. Bacon, Consulting Chemist. "Manufacture and Uses of Vegetable Oils."

George Frank Lord, DuPont DeNemours Powder Company. "Chemical Effect of Dynamiting the Soil."

Percy Wilson, Secretary, Association American Portland Cement Manufacturers. "The History of Cement."

MEETING OF THE AMERICAN PAPER AND PULP ASSOCIATION (TECHNICAL SECTION)

Friday, September 24

W. D. Coolidge, General Electric Company. The "X-Ray."
Philip Sharples, Barrett Manufacturing Company. "The Development of Refined Tars for Use in Road Construction and Maintenance."

S. P. Sadtler, S. P. Sadtler & Sons. "Some American Contributions to Industrial Chemistry."

L. H. Baekeland. "Chemical Industry."

JOINT MEETINGS OF THE NEW YORK SECTION AMERICAN CHEMICAL SOCIETY AND THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Saturday, September 25

Raymond F. Bacon, Director, Mellon Institute. "Research and Progress in American Manufacturing."

John Barrett, Pan-American Union. "The Great Pan-American Opportunity."

The exposition is under the management of Charles F. Roth and Adrian Nagelvoort. Following are the members of the Advisory Committee.

Raymond F. Bacon, Director, Mellon Institute.

Charles H. Herty, President, American Chemical Society.

Henry B. Faber, Moore Filter Company.

A. D. Little, A. D. Little, Inc.

R. P. Perry, Barrett Manufacturing Company.

Wm. Cooper Procter, The Procter & Gamble Company.

E. F. Roeber, Editor, *Metallurgical and Chemical Engineering*.

George D. Rosengarten, President, American Institute of Chemical Engineers.

T. B. Wagner, Corn Products Refining Company.

Utley Wedge, Tennessee Copper Company.

EXHIBITORS

Following is a partial list of the exhibitors entered to date:

Abbe Engineering Company; American Bitumastic Enamels Company; American Chemical Society; American Hard Rubber Company; Automatic Weighing Machine Company; Ault & Wiborg; J. T. Baker Chemical Company; Wm. Beckers' Aniline & Chemical Works; Christian Beckers, Inc.; Benzol Products Company; Boonton Rubber Company; Bethlehem Foundry & Machine Company; Buffalo Foundry & Machine Company; Brown Instrument Company; Celluloid Zapon Company; Chadwick Boston Lead Company; Chemical Process Company; Condensite Company of America; Detroit Range & Boiler Company; J. P. Devine Company; Union Sulphur Company; U. S. Smelting, Refining & Mining Company; Valley Iron Works; Werner & Pfeleiderer; Wilson-Maculen Company; U. S. Government: Department of Agriculture, Bureau of Chemistry, Bureau of Animal Industry, Bureau of Plant Industry, Forest Service, Department of Interior, Bureau of Mines, U. S. Geological Survey, Department of Commerce, Bureau Foreign and Domestic Commerce, Bureau of Standards, Bureau of the Census; Zareemba Evaporator Company; Sowers Manufacturing Company; Dorr Cyanide Machinery Company; Driver Harris Company; Duriron Castings Com-

pany; DuPont DeNemours Powder Company; Thomas A. Edison; Eimer & Amend; Elyria Enameled Products Company; Charles Engelhard; Fairview Fluorspar & Lead Company; Foote Mineral Company; General Bakelite Company; General Chemical Company; Gerdes & Co.; Glens Falls Machine Works; Emil Greiner Company; Hanovia Chemical Company; Hardings Conical Mill Company; Heller & Merz Company; Huff Electrostatic Company; Huyck & Sons, F. C.; International Filtration Corporation; International Instrument Company; Kieselguhr Company of America; L. O. Koven & Brother; Lead-Lined Iron Pipe Company; Lenz & Nauman; Emil Lungwitz; Macbeth Evans Glass Company; Metallurgical & Chemical Engineering; Monsanto Chemical Company; Mott, J. L., Iron Works; National Aniline & Chemical Company; Norton Company; Pfaunder Company; Raritan Copper Works; Schaum & Uhlinger; Schaeffer & Budenberg Manufacturing Company; Scott, Ernest, & Co.; Standard Aniline Products, Inc.; Stamford Manufacturing Company; Sweetland Filter Press Company; Swenson Evaporator Company; Thwing Instrument Company; Toch Bros.; Tolhurst Machine Works; Troegerlith Tile Company; United Lead Company.

FIRE-RESISTIVE FLOORING

That wood will eventually be supplanted by fire-resistive material in floor construction, in all buildings housing large numbers of people, is the firm conviction of many of our foremost architects and engineers. The importance of securing a flooring material that is at once firesafe, sanitary, easy of tread, thoroughly durable, and which commends itself to the judgment of fire underwriters cannot be exaggerated. Happily, the subject is one that is receiving increased attention from the building fraternity.

Speaking of the development of the composition floor idea, I. Holbrook Townsend, vice-president of the Troegerlith Tile Company of New York City, said to CONSTRUCTION:

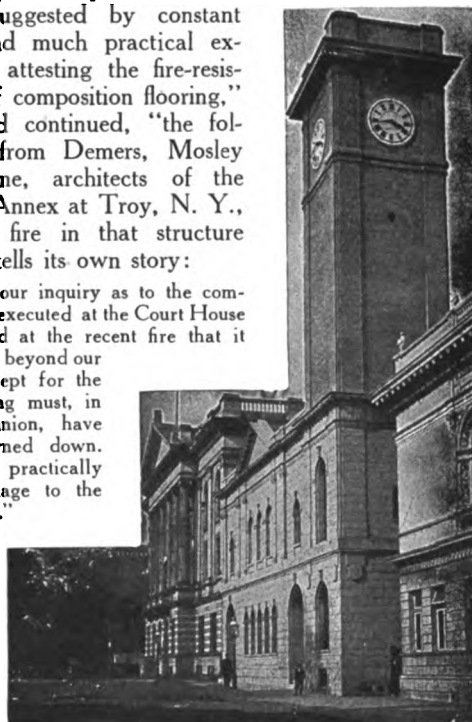
"It is only within the past few years that architects have felt justified in specifying composition flooring, although the need for some such building method had long been recognized. Like all other new industrial products its introduction gave birth to scores of concerns with varied formulas of manufacturing and methods of installing their floors. As was to be expected, the results produced differed widely; the work of some companies and individuals proving so unsatisfactory as to create severe prejudice in the minds of certain architects as to the desirability of the product as a whole. Fortunately, however, other companies of superior knowledge and equipment were able to demonstrate the worth of the new material, and now, after years of painstaking and efficient effort, have secured for it a substantial and ever widening market. Some of the formulae and methods adopted by the company with which I am associated were brought to this country from Germany when the composition floor industry here was still

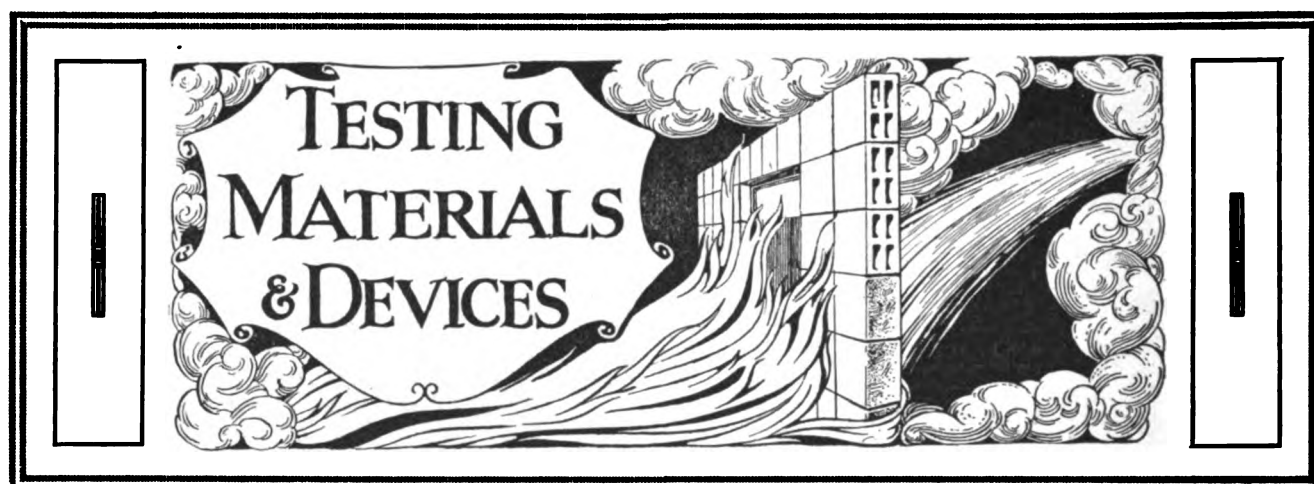
in its infancy. Of course, the ideas thus early had were altered and improved upon from time to time as suggested by constant experiments and much practical experience. As attesting the fire-resistive qualities of composition flooring," Mr. Townsend continued, "the following letter from Demers, Mosley and Campaigne, architects of the Court House Annex at Troy, N. Y., regarding the fire in that structure sometime ago tells its own story:

"In reply to your inquiry as to the composition flooring executed at the Court House Annex, we found at the recent fire that it withstood the fire beyond our expectations; except for the same, the building must, in the writer's opinion, have been totally burned down. The composition practically limited the damage to the effects of smoke."

COURT HOUSE ANNEX

Troy, N. Y.





TESTING HOLLOW TILE

An organization whose activities during the first six months of its existence give promise of great future usefulness is the Hollow Building Tile Manufacturers' Association, of which J. A. Maahs is president and Charles T. Harris secretary.

Among the more important work consummated or initiated by the Association thus far, according to the report of Secretary Harris, is the arrangement for a scientific test of hollow tile, "both as regards its strength as a structural unit and its fire-resisting properties," by the American Society for Testing Materials. "The preparation of data and arrangement of tests will be in the hands of a special committee, of which the following were the recommended members: R. W. Allison, National Fire Proofing Company, Pittsburgh; P. H. Bevier, National Fire Proofing Company, New York; Frank W. Darling, the Clay Product Company, Chicago; W. G. Demarest, Raritan River Clay Products Company, New York; W. C. Dennison, Ohio Clay Company, Cleveland; J. G. Griffith, Bureau of Standards, Pittsburgh; E. V. Johnson, Chicago; B. C. Keeler, Mason Brick & Tile Company, Mason City; J. A. Maahs, Pennsylvania Fire Proofing Company, Erie; Virgil G. Marani, Cleveland; Rudolph P. Miller, New York City; Clyde T. Morris, professor of structural engineering, Columbus; Edward Orton, Jr., professor of

ceramic engineering, Columbus; L. H. Provine, professor of architectural engineering, Urbana; E. C. Shankland, Chicago; R. E. Whitacre, Whitacre Fireproofing Company, Waynesburg.

The Committee on Codes and Specifications had been unusually active in preparing data that would be of value to municipalities in the revision of their established building codes. The code as finally approved by the Hollow Tile Association will shortly be printed, together with notes explaining the adoption of each important section.

Under the direction of its chairman, the Committee on Business Ethics presented a report that "was one of the most complete, fair and reasonable forms for putting the business on a higher plane and of doing business with absolute fairness and justice, as between competitors or agents or representatives, that could be submitted to any association for the conduct of its business."

The need for a broad publicity campaign by the Association was dwelt upon by the secretary in his report, and the creation of a modest sum for such purpose recommended.

Other matters of general concern were taken up by the Association, whose members recognize the need for co-operative effort and are willing to work for the common good.

For Improved Risks

Among the representative fire insurance companies the strife for business is becoming more and more severe, and this is especially true of the better grade of risks. To compete with the factory mutuals of New England the stock companies have organizations, both East and West, whose engineering staffs are at the service of prospective builders for aid in constructing properties along fire-safe lines. In defining the purpose of the recently-formed Western Improved Risk Association of Chicago, its management said in part:

"The objects of this association are by collective effort to conserve the resources of the country by a reduction of the fire waste; to inspect property; to encourage improved fire-resisting construction of buildings; to furnish property owners and association agents advice of competent engineers on the subject of building construction and the installation of protective devices; to render such assistance to association agents as may be consistent with the requirements of the business; to

insure, through resident agents at the points where the property may be located, such risks as meet the approval of its members against loss or damage by fire, tornado, sprinkler leakage to buildings and their contents, and to insure against loss of rents and use and occupancy of property."



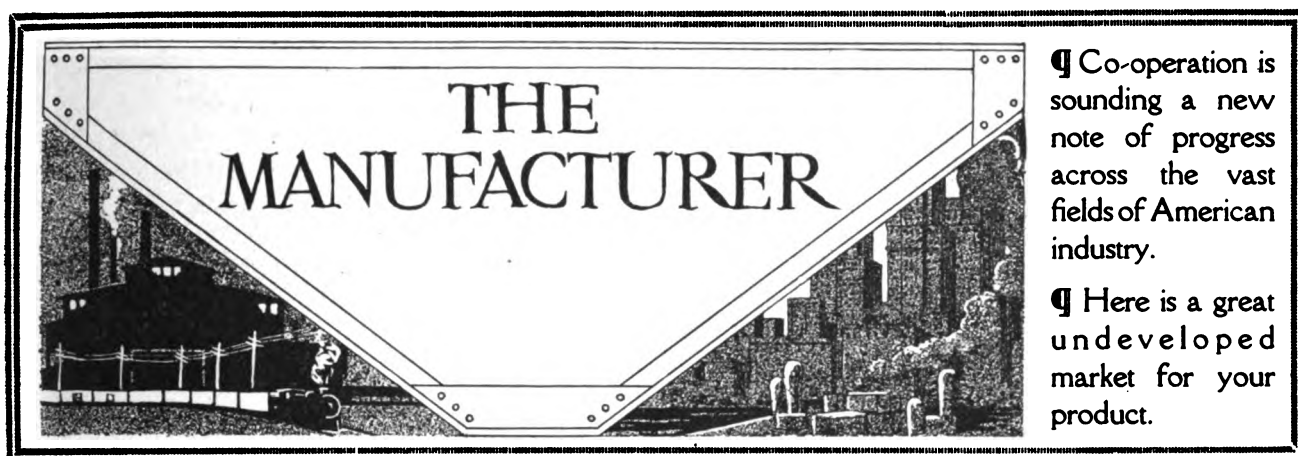
Seek Uniformity in Sizes

Fire chiefs of Central Ohio will meet on the 12th inst. and discuss means for securing uniformity throughout their field in hose couplings and fire hydrants.



Dwelling Houses in Connecticut

According to Tax Commissioner Corbin, the dwelling houses of Connecticut at the close of last year numbered 189,322, and were valued at \$446,787,286, the average value per house being \$2,359.



THE NEED FOR ASSOCIATED EFFORT

The Value of an Association of the Manufacturers of Standard Fireproofing Materials and Protective and Extinguishing Devices for the Purpose of Encouraging the Construction of Consistent Firesafe Buildings, and so Increasing the Demand for Their Products, Cannot be Overestimated

For many years the value of association effort has been recognized in every line of manufacturing—except one. That one unorganized field is standard fireproofing materials and protective devices.

Here and there are single trade organizations, each working independent of the other, and, unfortunately for all such efforts, frequently trying to check and oppose the advancement of each other.

While each of these trade organizations undoubtedly has a mission in its particular field, and does a service that no other form of organization could duplicate, yet there is a much greater need of one general agency promoting consistent firesafe buildings.

About a year ago there was formed such an association, known as the Society Advocating Fire Elimination, with national headquarters in Cleveland, Ohio. It has assumed national proportions, and includes in its membership manufacturers and dealers in practically every known material entering into firesafe construction, as well as other interests concerned with engineering, construction and equipment of firesafe buildings. This organization has become popularly known as "The Safe," the initials being S-A-F-E.

For any manufacturer to undertake a nation-wide publicity campaign means great expense both in money and time. Nowhere is competition keener than among the manufacturers in question, and every argument brought forth exploiting the merits of a particular brand is, in many cases, contradicted immediately by rival sales organizations, thus creating a condition strongly detrimental to the general demand for the product involved.

Again, individual advertising, without the backing of general advertising of the product in question, means duplicated effort. There are so many manufacturers of a particular product trying to do the same thing at the same time—spend-

ing good money in ineffectual publicity work—trying to convince a prospective building owner that he should make a *certain part* of his building fireproof. Would it not be more logical to show him the advantages of making his entire building consistently fireproof? Would this not entail the use of standard materials and devices of all kinds and greatly increase the demand?

The arguments for making a building consistently fireproof throughout are of the strongest possible nature and cannot be overlooked by any sensible-minded man. Correct fireproof construction, in its drastic reduction of insurance rates and cost of maintenance, is not only of monetary value, but the lessening of the potential fire hazard in any building means business security which is invaluable. To know that one's business is not liable to the inconvenience and loss of time incident to a fire—to know that there is no danger of valuable records being reduced to ashes—to know that an intricate system representing the labor of ten years cannot be disrupted and disorganized in a few minutes—all this constitutes part of the true and direct value of a consistent firesafe building.

What a Fire Loss Means to a Manufacturer

The shortcomings of the Edison buildings from a fire-resisting standpoint were long obvious to insurance men, and some two years ago were pointed out to Mr. Edison by one of their engineers, following an inspection of the plant made on behalf of the Underwriters' Association of the Middle Department. The inspector recognized the substantial character of the concrete walls and supports, but appreciated that these were not alone sufficient to confine a fire once under good headway. He pointed out to the manager in charge the imperative need for reducing the great floor areas by means of partition walls, and of protecting all windows and openings by wireglass and metal doors of thoroughly approved

pattern. The installation of an efficient sprinkler system was earnestly advocated, the underwriting engineer holding that with so much material around, capable of generating quickly an intense heat, too great care could not be given to incipient protection. Although the recommendations of the inspector were promptly laid before Mr. Edison, the electrical wizard saw fit to disregard them, holding that the solid character of the buildings, plus the constant watch service employed, was a sufficient guarantee against fire loss.

Failure to follow the safeguards pointed out by the underwriters cost the Edison concern a heavy direct and a still more severe indirect loss, the fire of December last not only destroying valuable machinery and material, but seriously disarranging the extensive and complicated operations of the corporation.

This fire in the plant of Thomas A. Edison clearly demonstrates the folly of building inconsistent fireproof buildings. If the various openings had been properly protected with wire-glass and metal windows and doors, *if the building had been consistently constructed*, the great direct and indirect loss incident to that fire would have been avoided. Good advice, given by a competent body of engineers working in the employ of the combined manufacturers, if followed, would have resulted in the use of materials and devices which were not used, thus enlarging the market for those particular products; and the questions which have arisen as to the merits of good fireproofing materials which *were* used in the construction of these buildings, but *improperly supported because of inconsistent construction in their purpose of making the building fireproof*, would not have arisen; and the great cost of proving that these materials did not fail in that particular fire would have been saved.

Here is an example of the wrong kind of publicity and herein would lie the benefit of an association formed for the purpose of advising the proper combination of standard materials and devices in building construction. Concrete or terra cotta walls and floor arches, or metal trim, or sprinkler systems will not alone make a building fireproof. They must be combined properly for the construction of an unburnable building.

This fire, and this is only one of thousands that are occurring annually in this country, proved a direct loss to manufacturers. The unused materials and devices constitute a small part of a great neglected general market wherein thousands of dollars which might be earned by manufacturers of standard materials and devices go to waste every year—are literally burned up.

Another Phase of the Manufacturing Problem

The existence of wrong conditions in every line of fireproofing material and protective device manufacture is plainly evident to the keen observer. Take, for instance, two great industries—the manufacture of hollow metal doors and trim, and of hollow building tile products.

The hollow metal industry is to-day suffering severely from at least two existent wrong conditions. The first is the lack of a proper differential insurance rate which this product un-

doubtedly deserves—a rate giving preference over doors and trim of inferior construction. This rate can never be obtained by the hollow metal industry working alone, but a greater organization, working with the underwriters for the purpose of obtaining proper recognition of consistently built fireproof buildings, could bring it about.

Another great source of loss, as almost every company in the business could testify, is the making of errors in figuring quantities. Mistakes of this kind have cost millions of dollars and have made unpleasant history. A central checking bureau which could be maintained by the proposed association would immediately forestall any possibility of such loss. It has been demonstrated that an association of this line alone could not successfully carry out the proposed work—the demand is for a greater, unbiased organization.

Building codes throughout the country have discriminated against the use of terra cotta as a fireproofing material. Why? *Because there are no standard specifications for the use of terra cotta.* Terra cotta blocks, wrongly specified, have failed at the crucial moment, thereby bringing the product into disfavor with the various underwriting bodies. The hollow tile industry needs the services of a great organization, which can go before the underwriters without a direct selfish appeal and assist in the carrying out of such recognized tests as will put hollow tile in its proper place as one of the best of fireproofing materials if *properly used*.

Conditions of this kind exist throughout the various lines of manufacture—individual problems which could best be remedied by a great national organization made up of the varied industries. The power of such an organization, in no way interested in the question of prices, working for the general propaganda of improved construction, is inestimable.

The community of interest which would thus be established among all these manufacturers would bear good fruit in that it would frequently bring them together in conference on matters relating to the increased use of standard fireproofing materials and protective devices, an object of common interest to all. They would learn of other views on vital points connected with the manufacture and sale of their products, get to know one another better and learn to respect and tolerate the views of their competitors, thus exercising a wholesome, educational influence on all.

A Strong Rival Organization

The idea of a general manufacturers' organization, for the purpose of promoting the use of various products which must be combined in construction work, is by no means a new one. At the present time the National Lumber Manufacturers' Association is entering into a strong campaign which is directly against the interests of the manufacturers of fireproofing materials.

At the lumbermen's meeting in Chicago on February 24 and 25 last a new department was created which will spend \$50,000 a year for the next five years for the purpose of conducting a national campaign to increase the use of wood as a structural material. This work will be carried out through

a very carefully selected general engineering and statistical force working for the granting of favorable insurance rates and the passing of legislation conducive to the use of wood in buildings. Publicity work will also be carried on through the medium of exhibits, speakers, bulletins, newspapers and general advertising.

Now, if ever, is the time for the manufacturers of the materials and devices used in fireproof construction to get together and act!

The publicity given to lumber must be offset in the public mind by a proper presentation of the merits of consistent fire-safe construction. The natural question is—how? Following is the answer:

The Society Advocating Fire Elimination

The only organization in the United States that offers a medium of action on the part of the varied interests whose bread and butter results from the use of firesafe building materials and devices is The Safe. This association enters upon its second year with a national magazine as its official organ and a representative membership which should win for the movement the confidence and whole-souled support of every manufacturer and salesman of those materials threatened by the lumbermen's campaign.

One of the first activities of the lumbermen in the use of its fifty thousand a year is to seek repeal of the ordinance in Birmingham, Ala., which prohibits the dangerous wooden shingle. The safe shingle law went into effect in the Alabama city a few months ago, and in attacking it the lumbermen have allied with them the trade unions interested in wooden shingle construction and the manufacturers of roofing paints. All possible pressure is being brought to bear to overthrow this same legislation, and there is no organized effort to help sustain it.

The Safe should be provided with funds sufficient to send a representative to Birmingham equipped with convicting evidence against the shingle roof, and acquaint every inhabitant of the city with the danger that threatens if the lumbermen are able to kill its most important safety ordinance.

The needs of such efforts wherever the lumbermen use their vast funds against safe building will appear more and more frequently in the future. Manufacturers of the permanent materials, who have been enjoying a small increase in demand for their goods during the past few years, will find the growth of their business checked unless something is done to counteract the publicity and so-called "educational work" of the lumbermen.

There is a distinct advantage in getting to the public first. The truths about the safety and economy of using materials that will not burn or deteriorate, as against inflammable materials, has an ineffaceable punch with the man-about-to-build unless it is clouded and obscured by misinformation.

For more than a year The Safe has been using the limited means at its hand to spread the right kind of publicity that will create a demand for the right kind of materials. It has thrown its influence, wherever possible, toward safety legislation, and has given to its members a service embracing the

data upon fire losses, comparative costs of building, building operations and copy for advertising and free publicity.

Since its effort has been wholly in the interest of firesafe construction and not in the interest of any special material, it is recognized as unselfish by officials and by newspaper publishers. As an example of this kind of an approach the Cleveland chapter of The Safe was able during its first year to have published in the four English newspapers of Cleveland more than 105 columns of matter upon safe construction and equipment.

What has been done in one American city may be done in others if the manufacturers and dealers of that section will unite for the effort.

In addition to the national headquarters of The Safe in Cleveland an Eastern office has been established in The Times Building, New York. There are active members of the organization in eight States and in twenty-five cities. It is the aim of those who are back of this great movement to have a local chapter in every city, each with an executive secretary giving his entire time to publicity and legislative work.

With this issue of CONSTRUCTION this magazine becomes the official organ of the Society, and its agency will give impetus to the cause and give a medium for exchange of thought and information among the members of The Safe.

Full information regarding membership and plans for local organization will be given at either the Cleveland or New York offices of the Society. The membership fee is nominal and insignificant compared with the service rendered. The object is not to put a burden upon a few but to enlist every concern that will be benefited by the work of the Society.



SAFETY FROM FIRE ITS SLOGAN

Protection to life and property from fire is the aim of the fire insurance and fire prevention committees of the Safety First Federation of America, which latter organization has now a large membership and is doing efficient work along various lines. At a lately held gathering of the committee the subjoined resolutions were decided upon for presentation at the annual convention of the Federation, to be held at Detroit early in October.

The enactment of fire prevention laws in all States.

The establishment of a National Fire Prevention Day, October 9 being recommended.

A campaign of education in fire prevention, to be directed by the following committee: Edward R. Hardy, chairman of the Safety First Society of New York; C. Albert Gasser, inspector of combustibles and fire risks, representing the Newark Board of Trade, and William Guerin, chairman of the fire prevention committee. It is proposed to urge laws for the teaching of fire prevention in all schools, public and private.

The appointment of fire marshals in all States.

Legislation to regulate the manufacture and disposition of explosives and inflammable materials, including fireworks, and regulations regarding aisles, exits, etc., in public buildings.

Legislation making persons liable for loss to others resulting from fires caused by carelessness or criminal intent, with the additional provision that municipalities may recover all expenses incurred in the extinguishment of fires so caused.

Laws providing for State building codes, with the following committee to draft a model code: Chairman, J. O. Hammit, the New York Fire Department, and A. D. Iddings, Dayton, Ohio; Frank Hague, Jersey City.

Fire Losses and Rebuilding Plans

That experience is an efficient, though expensive teacher, is evidenced by the willingness of many property owners who have suffered fire loss to rebuild along firesafe lines. From numerous reports received from such parties located in all parts of the country, CONSTRUCTION presents below a list of fires that have occurred during the past few weeks; the cause of fire, where it could be ascertained, and the plans for rebuilding, in so far as these have been determined upon at the time of going to press. This data will appear in the

columns of CONSTRUCTION each month, with a view to informing architects, builders and property owners as to the principal fire hazards and the progress that is being made in firesafe building. While the process of educating the general public to the need of greater care is the erection of buildings that will withstand fire is a slow one, yet it is making steady headway and the constant mission of CONSTRUCTION is to advance the cause to the full limit of its power.

CONNEAUT LAKE, PA.—A lighted candle in the linen room is held responsible for the burning of the Hotel Oakland, with a loss of \$24,000. "The fire had a good start when discovered, and, there being no fireproof material around it, it was soon beyond control." Manager D. L. McGuire began rebuilding "a modern hotel containing about one hundred guest rooms" a short time ago.

CINCINNATI, O.—Crossed electric wires resulted in a \$40,000 loss in the plant of the Cincinnati Grain Company. Believed that if "the cut-off had been put in an iron or other metal box the fire would not have occurred."

SHERIDAN, WYO.—While the cause of a fire in the extensive plant of the Sheridan Commercial Company is unknown, the theory is that it originated in paper stored in a chute. The destroyed building "was of wood construction covered on the outside with sheet iron." The new structure is to be of brick or concrete and as nearly fireproof as it is possible to make it, "Manager D. E. Gwinn advising that the company is desirous of avoiding a recurrence of the terrible experience it has just passed through."

UNION, N. Y.—Profiting by experience, the Union Forging Company is rebuilding its burned plant of "brick and steel—practically fireproof construction."

THIEF RIVER FALLS, MINN.—Starting among lumber piled on a rear platform, fire caused a loss of \$44,300 to the Thief River Grocery Company. The building was of brick construction, and, in the opinion of its owners, "there would have been no fire had not the flame from the lumber broken a window and caught on inflammable material inside."

PHILADELPHIA, PA.—A thoroughly "modern cement fireproof building will replace that of Thomas Potter, Sons & Company, burned with a loss of close to \$50,000. Spontaneous combustion is thought to have caused the fire.

NEW BRIGHTON, PA.—Loss of approximately \$200,000 followed the fire in the property of the C. C. & E. P. Townsend Company. The burned section of the plant is being rebuilt "of brick, iron and steel."

PEORIA, ILL.—Spontaneous combustion is thought to have caused the fire in the plant of the Wilson Provision Company, the loss therefrom being \$65,000. Rebuilding upon former lines is well under way.

STORM LAKE, IOWA.—Defective wiring resulted in a \$10,000 loss to the dormitory of Buena Vista College.

SAPULPA, OKLA.—Incendiaries succeeded in burning the Lyric Theatre, with a loss of close to \$20,000. The destroyed property will not be rebuilt; at least, not upon the same site.

SKANEATELES FALLS, N. Y.—Starting in the rope drive of

the Glenside Woolen Mills, fire caused \$30,000 loss, though comparatively small damage resulted to the building proper.

HELENA, ARK.—Loss of \$20,000 was suffered through the fire in the garage of the Tappan Hardware Company, the origin of which is unknown. To prevent a recurrence of the disaster the new building is being constructed of "steel beams and asbestos roof, as well as steel window frames with wire glass windows. Between the repair, show and storage room a brick wall will be built," says President Tappan.

DEL RIO, TEX.—Incendiarism is suspected as responsible for the \$10,000 fire loss caused the Del Rio Steam Laundry. Manager C. A. Chaslang arranged for the erection of a 40 x 70 building of reinforced concrete.

MARION, OHIO.—Immediately following a \$35,000 fire in its plant, the Marion National Mill Company arranged for the erection of a thoroughly modern structure. In its building "concrete reinforced steel" is being employed, fireproof from top to bottom, using steel for spouting elevator leg, etc., wherever possible.

LOVELAND, OHIO.—Originating in the furnace building of the Champion Carbon Company, fire damaged the structure to the extent of \$40,000. "Fuel oil under pressure for the furnaces was being used at the time, when one of the pipes broke, permitting the rapid spread of the flames." The company hopes to rebuild.

OKLAHOMA, IOWA.—Although undecided as to location, the Interstate Manufacturing Company plans, about the first of the new year, to replace its factory recently burned. Loss, \$20,000. The new structure will be of fireproof design.

BOLIVAR, TENN.—Spontaneous combustion in the drying room was responsible for \$30,000 fire damage caused the Western Hospital for Insane. In rebuilding, the new structure is to be "fireproof with reinforced concrete floors, as the laundry is built over the engine room. Metal dryers will be used."

CAMDEN, N. J.—The plant of the Curtain Rod Manufacturing Company was damaged to the extent of \$13,000 through fire following a stroke of lightning. Repairs to the building are under way.

KOKOMO, IND.—From an undetermined cause, a fire loss of \$104,000 was suffered by the Kokomo Canning Company, Inc.

DUNN, N. C.—Fire of unknown origin destroyed the residence of Hon. H. L. Godwin. Mr. Godwin plans "rebuilding of brick at an early date."

BUFFALO, N. Y.—The building occupied as tenants by the Robertson-Cataract Electric Company burned, with a loss of approximately \$200,000; the cause of the fire could not be ascertained. The company has rented new quarters.

WITHSTANDS SEVERE FIRE TEST

During the spectacular Board Walk fire at Atlantic City, on August 26 last, the Hotel Strand, one of the most popular hostelrys of the famous watering place, was subjected to a severe fire test, being but a short distance from the fiercely burning Ridel property. That the hotel escaped wholly is a high tribute to its structural composition and reflects great credit upon its designers and builders.

The Hotel Strand, of which Irwin and Leighton of Phila-

delphia were the building contractors, is of steel frame construction, fireproofed with cinder concrete and with brick exterior walls, terra cotta trimmings and slag roof. In its interior finish a minimum amount of wood was used. In the bed rooms the floors were finished with cement top coats, on which the carpets were laid direct. The interior partitions are all of mackite. To further safeguard its guests the hotel has a private fire protection system, with adequate hose equipment on each floor.



THE ORGANIZATION OF A FIGHT AGAINST FIRE

By Ira G. Hoagland, Sec. Nat'l Automatic Sprinkler Association

The war in Europe reveals one thing above all others—that armed strife between sovereign powers, a conflict of destruction, is one of the most highly organized endeavors of man. The fire waste in the United States reveals that the strife against fire, a constructive conflict, is a very poorly organized endeavor, in this country at least.

This country is waging a losing fight against fire. A patriotic American would deny vigorously the possibility of defeat by a hostile nation in the event of war. But if the United States is too poorly organized to successfully war against fire, which is at worst a passive enemy, what could be expected if an active human enemy had to be resisted?

The "Spirit of '76" would awake! But why is it asleep now? Not only is the strife against fire a losing battle; it is not even a game fight! That is a severe arraignment, but not too severe in view of the extent of the indifference to the fire question.

Where is the spirit that fought the imposition of a tax on tea in the days when this country was being conceived? The fire tax of to-day is far worse an imposition. The fire tax is on necessities; the tea tax was on a luxury.

If this country became aroused against the fire tax the way the Colonies were aroused to protest the tea tax, public opinion would become so strong that scorn instead of sympathy would be meted out to the man who has a fire. Instead of "fire sufferer" he would be "fire culprit."

In Louisville last year the fire insurance loss was \$3.42 per capita, the actual property loss per capita about \$4, and the gross fire tax \$12 per capita! Surely there is need of organized war against fire—these conditions are general in the United States.

Who will wage a war against fire? In the Civil War the Federal Army was composed of a few regulars, many volunteers and some conscripts. In the war against fire the "regulars" would be architects and engineers in private practice or in government service, State and civic authorities, fire departments, also engineers and others in the employ of fire

insurance companies, or other enterprises interested in fire prevention and control; the "volunteers," citizens who would of their own accord take heed of advisory instructions and do their duty in the fight; and the "conscripts," those who need the compelling power of the law to influence their efforts.

Anticipation of Fires

Anticipation of fires comprehends the elimination of fire causes, arrangement of building construction to confine fires to localities of origin, and provisions for the control of incipient fires. Here is work for the "regulars," "volunteers" and "conscripts" in the fire defense army.

The agencies for eliminating causes of fires are as follows: Education of public in avoidance of fires—"Mustering in the volunteers."

Inspections by competent persons to seek hazardous conditions, recommend improvements, enforce laws and ferret out the mischievous and careless—"first line" work of the "regulars."

Enactment of laws and ordinances to persuade the willing and compel those who are not, to take certain necessary precautions in respect of the storage and use of combustibles, installation of lighting and heating services, etc.—"tactics" for the willing and rules for those who need them.

Another kind of legislation, and most useful as a fire deterrent is that which imposes individual liability for fires due to carelessness or neglect—"impressing" the "conscripts."

Public Education.—Educating the public how to avoid fires is accomplished in various ways; by talks to school children; by distribution of appropriate literature; by talks with business and professional men at the meetings of their organizations, etc.

Fire Prevention Inspections.—Every city should have a well-defined plan for inspecting buildings and their contents during occupancy to apprehend conditions likely to breed fires. Some progressive cities have established special bureaus

for this purpose, but every city in its established fire department has a potential agency for this work. Also contributing are the inspectors of local rating and inspection bureaus of fire insurance companies' organizations, also special agents and inspectors of individual companies. The fire insurance patrols in some cities assign men to routine fire prevention inspections. In some States the fire marshal and Insurance Department are established on such broad lines as to permit of the development of valuable fire prevention work; and in some cities the local fire marshal's office is similarly organized.

Laws and Ordinances.—Laws and ordinances should cover explosives, inflammables and combustibles, use of electricity and installation of heating apparatus.

Regulations should conform to the suggested ordinances and requirements issued by the National Board of Fire Underwriters. Administration of laws should be competent, enforcement strict and inspections frequent. Laws to cover inflammable fluids and their compounds, and all kinds of explosives and combustible rubbish are as follows:

Inflammable liquids of Classes I, II and III; hazardous chemicals; gases (including acetylene and carbide); garages; dry cleaning; nitro-cellulose films; motion pictures (machines and booths); explosives; fireworks; matches; combustible fibres, etc.; lumber and packing materials; rubbish, trash, ashes, bonfires, etc.

The National Electrical Code is the generally recognized standard for electric wiring. Its adoption by ordinance is important. Local ordinance should also provide that current shall not be furnished until electrical installations have been inspected and approved. Enforcement should be under the supervision of a properly qualified official and good results also may be obtained by co-operation with the local fire insurance companies' inspection bureau.

Individual Liability Law.—The idea of this kind of legislation is to make the person who has a fire because of negligence or non-compliance with requirements of laws or ordinances or of constituted authorities a misdemeanor before the law and liable for the damages caused and for the expense of extinguishing the fire. A law of this nature is in force abroad and in the Latin republics in Central and South America.

Recently the State of Pennsylvania enacted an individual liability law. In New York, Fire Commissioner Adamson invoked an ancient law and succeeded in collecting the amount of the fire department cost for extinguishing a fire, where the fire prevention bureau orders for improvements had been disregarded.

Telephone fire alarms should be sent to fire headquarters, where an adequate force of operators should be maintained to properly receive them. These alarms may be despatched to the proper fire companies by telephone, but should be confirmed by transmittal over the fire alarm system as box alarms. Each telephone exchange in a city should have a reserved fire-call circuit to fire headquarters. In cities with more than five fire stations, there should be a private switchboard at headquarters, with an individual circuit to each fire station. Louisville has a well-developed telephone fire alarm

auxiliary. In Louisville, in 1913, 72 per cent of all fire alarms were transmitted by telephone.

Fire Apparatus

Each engine or hose company should carry at least 1,000 feet of 2½-inch hose and have a complete spare shift. Companies responding to first and second alarms in mercantile or manufacturing districts, where hose streams direct from hydrants are used, should have 200 feet or more of 2¾ and 3-inch hose. Hose should be of an approved make, fitted with National Standard hose couplings and kept in good condition.

Companies should have complete minor equipment. A good quality of quick-fire coal for steamers and gasoline for motor apparatus ready for quick handling is necessary for proper operation of apparatus.

Adequate, preferably departmental, facilities for making repairs, spare apparatus and parts, insure proper upkeep. The number and suitability of horses, where used, for active and reserve service have to be considered. Company quarters must be designed to favor quick response, comfort of men and drying of hose.

Rigid discipline and impartially imposed and sustained fines and suspensions are important requisites in fire department administration. And regular drills in charge of competent officers work wonders in the efficiency, physical trim and self-reliance of the men.

Apparatus responding to alarms should be in proportion to the normal hazard of the district. In large cities four engine or hose companies and two ladder companies should respond to first alarms. An adequate running card is necessary to provide for responses to subsequent alarms and for outlying companies to move in to vacated stations.

Modern fire methods comprise the liberal use of chemicals, shut-off nozzles, salvage appliances to reduce water damage, powerful stream appliances; and the use of fire department connections of automatic sprinkler and standpipe systems and interior equipment; also ventilation of buildings.

Important, too, it is to have steam heaters in the fire stations, to keep up a low pressure of steam in the boilers of fire engines.

The essentials of the fire department agency in fire control have been but briefly presented. Every agency for fire control should be perfected without fear or favor.

Water Supply

Now comes the question of water supply, so necessary to fire department action, also, more or less, as a supply to automatic sprinklers. The ideal water supply is a gravity system which delivers the water direct from the source without the use of pumps. But a well-designed and properly safeguarded direct pressure system so nearly equals the gravity system in adequacy and reliability that there is little to choose between the two types.

Of course, a water supply service needs competent administration and efficient labor. Complete records and plans of

the physical structures and operation of the system, in convenient form, should be indexed and filed in duplicate. Emergency crews always available are necessary. Alarms of fire should sound in some quarters of the department.

As for adequacy of supply the basic considerations are the normal ability of the source of supply, including impounding reservoirs, and each part of the supply works to maintain maximum consumption demands and fire flow.

Water stored or impounded, enough to supply maximum consumption demands for five days and leave a 10-hour fire flow remaining is considered sufficient to permit of most of the repairs, alterations or additions to be expected in operating a water system.

There are many things to be considered in estimating the reliability of the source of water and the supply works. Pumping capacity must be sufficient to maintain maximum consumption and fire flow at required pressure with two largest pumps out of service. There must be ample boiler capacity in reserve. Pumping stations, say experienced engineers, should not contain any combustible materials in construction, unless protected from fire by automatic sprinklers.

In the distribution system, arteries and secondary feeders should extend throughout. Six-inch pipe is considered the minimum size satisfactory for hydrant supply. In high-valve districts the minimum should be 8-inch and 12-inch, and larger should be in the principal streets. Pipes should be cross-connected or "gridironed" as closely as possible.

Gate valves in the distribution system should be closely spaced and regularly inspected. This is necessary in proper upkeep. The spacing of hydrants needs special thought. They should not be far apart. Systematic care of them is necessary.

High-Pressure Fire Service System

A high-pressure fire system may have a gravity supply, direct pumping supply, or both. It may be a separate system for fire service only, or may be the extension of a high service domestic supply in a low service area. It should be capable of delivering the full fire flow required about any block at a pressure of not less than 150 pounds. Hydrants should be large. Each one should have four individually valved hose outlets. The average area per hydrant should not exceed 40,000 square feet.

"Such systems," says E. V. French of Boston, a noted fire prevention engineer, "furnish the extra heavy artillery with which to smash up and down a dangerous fire." Mr. French thinks that the very large expense entailed by such special fire service systems ought, if possible, to bring even greater benefits. He feels that these systems could be used safely as a supply to sprinklers. If this could be done and the ordinary service also used, making two independent systems available, a large cost on owners for tanks or pumps, etc., would be avoided and a material encouragement given to the larger use of sprinklers. This would mean a materially larger use of the expensive high-pressure systems and, consequently, a greater return for the money expended.

"If encouragement and requirements," Mr. French de-

clares, "could bring under sprinkler protection the danger spots in our cities the conflagration hazard could be practically eliminated. I have often wondered if the enormous expense for high-pressure systems and great fire departments would not, in reasonable time, produce better results if put into sprinkler work, coupled with reasonable requirements as to construction and fire cut-offs at danger points. I raise the question on whether more direct treatment of the danger at its source would not make the high-cost, high-pressure special fire system unnecessary in most cases and permit in many cities a very material reduction in the cost of public fire departments."



Recognize Sprinkler Protection

Rates upon buildings in the down-town section of Chicago equipped with automatic sprinklers were again substantially reduced a short time ago; the underwriters appreciating the lessening of the general conflagration hazard induced through the extension of the sprinkler protection, and also recognizing the favorable loss experience had by the companies upon risks so equipped.



Large Building Planned at Memphis

Aided largely by Eastern capital the Terminal Transfer & Storage Company of Macon, Ga., plans extensive terminal facilities at that city. The intended improvements embrace the erection of docks, warehouses, cold storage and icing plant, etc., following generally the idea of the Bush Terminal system of Brooklyn. It is figured that at least \$700,000 will be spent in carrying out the present plans.



Construction at Allentown, Pa.

Under the direction of the National Board of Fire Underwriters a critical inspection of the fire hazard of Allentown, Pa., was made by specially trained engineers a short time ago. In reporting their findings and conclusions the engineers state that, "owing to the weak construction in the mercantile section of the city, the danger from sweeping fire is severe." In the residential district, however, a better condition obtains, the buildings there being "mainly joisted brick, and having incombustible roofs." Fault, too, is found with maintaining the fire department headquarters in a non-fireproof building.



The insurance rates charged on frame construction and that on the safe building can be accepted as a fair, honest index of the exposure risk and the risk of loss. This rate is made with the one purpose of charging a premium that will adequately cover the loss and is based on records of experience over a long period of time.



Baltimore to Revise Building Code

When the Maryland Legislature next meets authority will be sought for the city of Baltimore to extend and modernize its present building code. It is desired to regulate the size and restrict the location of all structures designed for commercial purposes. The lately issued report of the New York Commission on Building Districts and Restrictions will serve as a guide to City Solicitor Field in preparing the Baltimore measure.



New Building Code Needed

In the opinion of the engineers of the National Board of Fire Underwriters a serious fire hazard exists at Erie, Pa., largely because of the poor character of its mercantile buildings. Concerning this danger the engineers assert that "The principal mercantile district is composed mainly of joisted brick buildings of defective construction, including a large proportion of excessive areas; there is a considerable amount of frame and a small percentage of improved construction.

"In the minor mercantile districts the hazard is small, but in the congested frame residential sections there is danger of sweeping fires because of the shingle roofs."



Building Inspection at Rochester

Among other suggestions offered by the Rochester (N. Y.) Bureau of Municipal Research for the more efficient government of the city are the following:

"That the Bureau of Buildings in the Department of Public Safety be made a division of building inspection in the engineering bureau of the Department of Public Works.

"That a fire prevention commission, to consist of the Commissioner of Public Safety, Fire Marshal, Chief of the Fire Department and two citizens, be created: the commission to be given "broad powers to formulate and promulgate rules and regulations governing fire prevention, and that its orders, rules and regulations have the force and effect of law."



If the facts and figures were properly presented in your community, the erection of frame buildings would be practically abandoned, not from compulsion, but from choice.

Prohibit Wooden Construction

Following the fire on July 28, last, which destroyed eight buildings in the business center of Coates, Kans., causing an estimated loss of \$100,000, the city council promptly passed an ordinance prohibiting the further use of wood in the construction of buildings upon the main street. In future all such structures must be of "brick, stone or other non-combustible material, and have fireproof roofs."



For New Building Laws

Under the direction of Prof. Ira H. Woolson, the National Board of Fire Underwriters has begun an extended investigation into wooden buildings of various types. It is intended to bring out clearly the poor construction methods discovered in each class, and suggest remedies therefor. As supplying by far the most numerous class, dwellings will be taken up first. The findings and recommendations of the Board will be made public through a series of illustrated pamphlets, which will be distributed gratuitously.



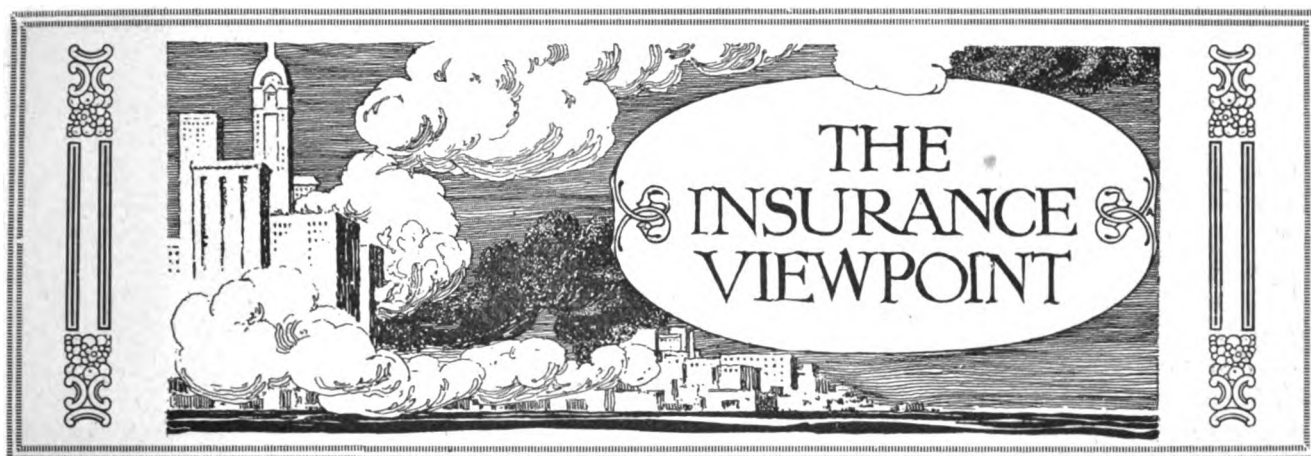
Would Enforce Building Laws

Speaking before the latest convention of the New York Firemen's Association, Secretary of State Hugo urged the adoption of a modern building code in every progressive community, a rigid and systematic system of inspection, and the creation of efficient fire and water departments as safety measures against fires. While Mayor of Watertown some years ago, Mr. Hugo was responsible for the creation of many of the protective measures that still obtain in that city, and which are important factors in reducing the local fire hazard.



State-Owned Grain Elevators

William J. Cleghorn, of Buffalo, owner of a large number of boats on the canal, is authority for the statement that "A movement is well under way to have introduced into the New York Legislature at its next session a bill providing for State-owned elevators in connection with barge canal terminals." Should the Empire State be induced to act along the suggested line, it is to be hoped a thoroughly modern and fireproof type of elevator will be built that will put to shame the great frame shacks that for so many years have done duty upon the shores of lakes Erie and Ontario.



Why Underwriters Favor Superior Construction

With the possible exception of the railways no class of institutions in this country are more generally misunderstood by the public or have been subjected to more burdensome and ill-considered legislation than the fire insurance companies. And yet fire insurance is one of the cardinal planks upon which the structure of business prosperity rests, for without the support it affords the banks would refuse loans to merchants and manufacturers and jobbers would decline credit to retail distributors. Business as now conducted would be impossible, and our whole system of commercial transactions would have to be radically recast.

Although the insurance business is of an extremely hazardous nature, and capital engaged in it is likely to be wiped out at any time should a sweeping conflagration such as occurred in San Francisco in 1906 visit Boston, Chicago or New York with their enormous congested values, the average underwriting profit of the stock companies during the past ten years has not exceeded two and one-half per cent. per annum. True, some offices have been able to pay handsome profits during that period and at the same time have added substantially to their respective net surplus accounts, but these companies constitute but a small part of the whole, and the profits enjoyed have come in the main from investments upon their reserve accumulations—money set aside to meet future liabilities. In other words, the profit in the fire insurance business today and for a decade past has been derived from the banking and not from the underwriting element.

As proof of this statement, the official records for 1915 show that more than half of the insurance companies lost money that year, and since Jan. 1, 1915, seven corporations have retired from the field absolutely, while four others have passed under the control of stronger organizations; the most notable instance in this latter respect being the purchase of the century old Franklin Fire of Philadelphia, with assets of over \$3,177,000, by the Home of New York. In the same period not a single company of importance has entered the arena, capital concluding upon examination that the opportunities for success were not sufficient to justify the investment.

Cause for Recent Conditions

Two primary reasons exist for the present wholly unsatisfactory condition of the fire insurance business. First and chiefly, the enormous and steady loss record of the country; and, second, the hampering legislation which forbids underwriters that freedom of action in taking remedial measures which they formerly enjoyed.

Extravagant in every respect, this unfortunate trait of the American people is strikingly shown in their indifference to the annual fire waste of the country, which last year averaged something like \$500,000 a day, and has shown no sign of diminution thus far in 1915. Speaking before the lately held annual convention of the National Wholesale Grocers' Association, its president, Oscar B. McGlasson, said in part:

Our great lawmaking bodies can make all the laws they want to govern fire insurance companies, the rating bureaus and methods of arriving at adequate rates, but not until the loss ratio has been materially reduced will there be any substantial reduction in rates, for there are more companies going out of business on account of unprofitable underwriting than are being organized.

Evidence that the public at large is at last beginning to appreciate the great economic waste caused by the burning of millions of dollars' worth of property each year, and the need for conservation in this highly important respect, is fortunately to be found, though the means thus far employed are woefully inadequate. In an effort to check the fire waste, a number of States, notably Illinois, Ohio and Pennsylvania, have now fire marshals whose duty it is to inspect all suspicious fires, and if the attending circumstances justify such action, to secure the arrest and conviction of those responsible for them.

The National Credit Men's Association is conducting an active propaganda among its members in favor of better fire safeguards, while the various underwriting organizations employ talent to address commercial bodies and trade associations along the same lines.

The National Board of Fire Underwriters, an organization boasting a membership of 152 prominent stock insurance companies, maintains at an annual cost of \$75,000 a staff of expert engineers, whose duty it is to constantly visit the larger

cities and towns of the country and determine their fire hazard. The building construction, fire department equipment and water supply are critically and intelligently examined, and if found defective remedial measures are suggested. The Board, too, has prepared and supplied, free of all cost, a model code of building laws, suitable for cities, towns and villages of different classes.

Hampering State Legislation

By decision of the United States Supreme Court the right of individual States to make fire insurance rates within their respective borders has been upheld, hence the insurance companies, instead of being free to fix premium rates as formerly, and thereby recoup themselves for excessive losses, must now accept the figures set for them by the lawmakers, few of whom, be it said, possess the requisite knowledge to measure hazards and the premiums that should be demanded for their assumption.

It should not require technical knowledge to appreciate that the fundamental of the insurance business is that of broad average, and that the naming of rates must be predicated, not upon city or State, but upon nation-wide experience.

Denial by State enactment of the right formerly freely enjoyed of naming their own charges has forced fire underwriters to turn more and more to a lessening of the fire loss in order to maintain their very existence, hence the eagerness of progressive insurance men to co-operate in any intelligently directed effort to attain that end.

Firesafe building erection and the adoption of other protective measures against fire, either individual or communal, are heartily favored by the great majority of the insurance companies, and in its propaganda for a reduction of the national ash heap through the most effective means, namely, encouraging the employment of superior building practices and material, "CONSTRUCTION" confidently counts upon the valued support of underwriters everywhere.



RATE MAKING IN THE INTEREST OF THE PROPERTY OWNERS

To a large degree it is true that under present-day rating schedules the property owner can name the premium which he must pay for his fire insurance. Under former conditions communities were rated by committees of special agents, each insurance company permitting the freedom of its field men for such service for a given period. Charges were imposed by the rule-of-thumb method, the "easy-mark" being penalized to offset the smaller tax placed upon his more belligerent neighbor, although the hazard in the latter case might be far greater than in the former. This unjust and unsatisfactory method in the operation of a great business is happily of the past, and the trend in fire underwriting everywhere is to grade the charge to the hazard. In fact, to do otherwise in many States would invite severe legal penalties.

Methods Employed in New York State

How rate making in New York (outside the metropolitan district) is conducted was explained by R. G. Potter, secretary of the Underwriters' Association of New York State, to a gathering of merchants and manufacturers a short time ago. In part, Mr. Potter said:

"Mercantile buildings throughout New York State are rated under what is known as the Mercantile Schedule. The basis rate on which we start to build up a mercantile building rate is what is known as the key rate of the city. This is determined by the application of the key rate schedule. As you know, insurance companies inspect their risks either through co-operative effort as evidence by inspection bureaus, or by means of individual representatives who visit a risk and report to their companies as to the condition in which they find it and pass upon the desirability of the risk as an underwriting proposition. The key rate of a city is based on the same kind of inspection. We examine an entire community as a company does an individual risk.

"Every element that enters into the desirability of a city or town as a place in which to write insurance is covered. A schedule called the key rate schedule is used for the purpose. This schedule covers the water supply, street mains, arrangement of hydrants, fire department and its equipment, its personnel and its management, the width of the streets, proportion of brick to frame buildings, conflagration hazard, building ordinances for the handling of explosives and the like. Starting with a basis rate, charges are made for departures from standard under all of the various items, and what is known as the key rate or basis rate for a community is established. It is possible for a community, like an individual property owner to reduce its base rate to a minimum by improvements to its water supply, fire department and by proper enforcement of a good building code. The rate resulting from the application of this schedule is the rate at which a naked building in the community to which the schedule has been applied could be written, if not exposed and not occupied. To this basis rate charges are made for deficiencies in construction, for hazardous occupancy, for defective lighting and heating arrangements and for bad housekeeping; and credits are given for features that are better than the average.

Adopting Safety Features

"Within reasonable limits the owner of a mercantile building can determine his own rate. If his building is seriously exposed by high rated and hazardous mercantile or manufacturing risks, he may cut off the exposure by installing wired glass windows or putting on standard fire shutters. If they are interior defects, such as open stairs, open elevators, light shafts, defective electric wiring, unsafe heating apparatus and the like, for which a charge is made under the schedule, the charge can be eliminated by removing the cause, and I submit that any property owner who maintains a mercantile building

with open elevators and stairways, which are always the keys to serious mercantile fires and which endanger not only his property but that of his neighbors, should be penalized by it. If he has a basement filled with hazardous rubbish, as far too many are, that may be the seat of a conflagration at any moment, he should be penalized for it. I might mention 100 other hazardous conditions that our inspectors are finding daily that are a menace not only to property but to life as well and for which the property owner is penalized, and that in nine cases out of ten could be entirely eliminated with but trifling expense.

"Do not lose sight of the fact that an incipient fire, or a fire which is confined wholly to the insured's own premises, is up to a certain point a personal matter. It should be kept

clearly in mind, however, that every incipient fire is potentially a beginning of a conflagration, and hence is not a personal but very obviously a community matter.

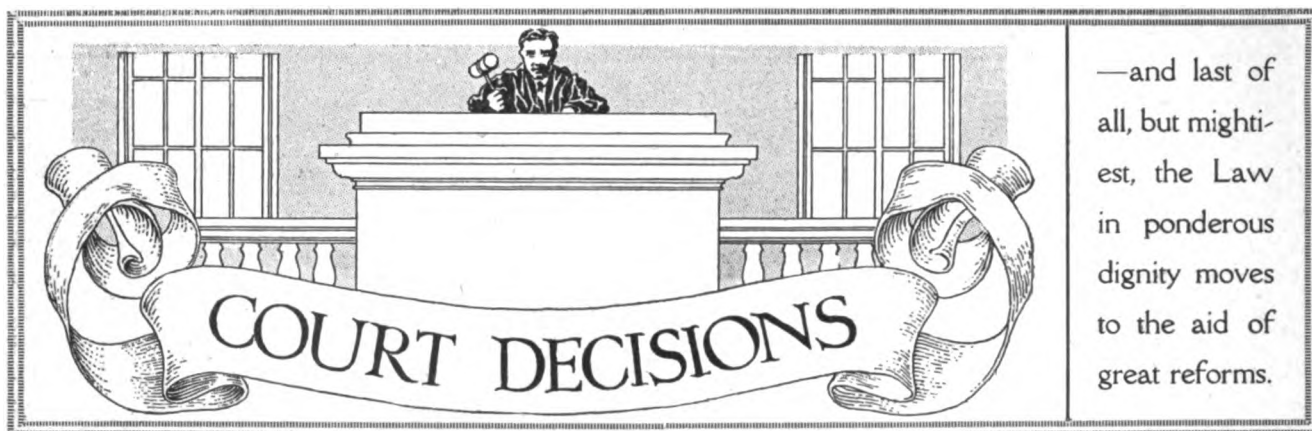
Law of Average Applies

"We do not pretend to say, and never will be able to say definitely, how much of a charge any specific defect in a risk is worth. Some charges may be a trifle high, some a trifle low. Unfortunately, there is no way by which the exact hazard of defective construction or of certain special hazards may be determined. We do know, however, that the general level of rates, as produced by the various schedules, returns enough revenue to the insurance companies to pay losses and expenses, and, barring disastrous conflagrations, sometimes a very small underwriting profit."

HOW WOOD BURNS

Continued evidence of the folly of using wood in general construction work is supplied by the number and seriousness of mill and lumber yard fires occurring throughout the country. We present below a partial list of this class of fires reported since July 1. The moral involved in the exhibit, of course, is "Build with non-burnable material."

Date	Name	Location	Estimated Loss
July 1	Raine Andrews Lumber Company.....	Evanwood, W. Va.....	\$30,000
	Edward Johnson	Brewster, Wash.....	75,000
	Barker Lumber & Fuel Company.....	Watertown, Wis.....	30,000
19	Aldridge Lumber Company.....	Aldridge, Tex.....	250,000
	Pacific Wood & Coal Company.....	Los Angeles, Cal.....	40,000
	Webster Lumber Company.....	Minneapolis.....	500
	W. H. Griffin & Son.....	Goldsboro, N. C.....	2,000
22	W. M. Brown Lumber Company.....	De Ridder, La.....	.....
24	Diamond Match Company's yards.....	Oswego, N. Y.....	600,000
	Lamar Lumber Company.....	Clyde, Miss.....	50,000
26	Laswell Lumber Company.....	Kenneth, Mo.....	35,000
	Hamilton Lumber Company.....	Indianapolis, Ind.....	30,000
	D. J. Plate & Co.....	Frances, Wash.....	7,000
	Pitt Lumber & Manufacturing Company.....	Greenville, N. C.....	50,000
	J. Stiger	Bowling Green, Ohio.....	7,000
	Frank Beechart	Roy, Wash.....	60,000
29	J. J. Newman Lumber Company.....	Sumrall, Miss.....	250,000
Aug. 1	Diamond Match Company lumber yard.....	Oshkosh, Wis.....	2,000
	Lutcher & Moore Lumber Company.....	Orange, Tex.....	150,000
8	Preston Brinkley Mill.....	East Suffolk, Va.....	.....
	H. F. Andrews Company.....	Bangor, Me.....	.....
	Ramey Lumber Company.....	Nez Perce, Idaho.....	30,000
12	Lomax Planing Mill.....	Greensboro, N. C.....	6,000
	Elizabethtown Planing Mill.....	Elizabethtown, Pa.....	35,000
	South Shore Cedar Company.....	Dollarville, Mich.....	11,000
	J. A. Veness Lumber Company.....	Winlock, Wash.....	350,000
	Churchill Milton Lumber Company.....	New Albany, Ind.....	50,000
	Green County Lumber Company.....	Springfield, Mo.....	.....
	Wyatt Lumber Company.....	Wyatt, La.....	.....
	Sommers Bros. Match Company's yard.....	Sandpoint, Idaho.....	75,000
22	Troy Box & Lumber Company.....	Green Island, N. Y.....	20,000
	California W. Pine & L. Company.....	Deelicker, Cal.....	290,000
	Feather River Lumber Company.....	Delicker, Cal.....	10,000
	Robert C. Brockway.....	Clinton, N. Y.....	.....
	White & DeHart Company.....	Watsonville, Cal.....	10,000
	Alexander Lumber Company.....	Campaign, Ill.....	25,000
	Storm Lumber Company.....	Union, Ore.....	3,000
29	Kane Sawmill.....	Kane, Pa.....	25,000
	T. E. Littlefield.....	Medford, Mass.....	25,000
	Bend Company.....	Bend, Ore.....	.....
	McDonald & McCrimmon.....	Miami, Fla.....	100,000
	Duff-Hetzler Company.....	Clarksdale, Miss.....	100,000
	Florida Sawmill Company.....	Paxton, Fla.....	50,000
	W. H. White.....	Boyne City, Mich.....	75,000
	West End W. W. Company.....	Petersburg, Va.....	10,000
31	Webb Bros.....	Reubens, Idaho.....	2,500
Sept. 1	Melone-Bovey Lumber Company.....	Minneapolis.....	18,000
	Gondert & Lemisch Lumber Company.....	Dayton, Ohio.....	25,000
	La Belle Box Company.....	Martins Ferry, W. Va.....	30,000



Removal of Material

Providing no fraud or willful wrong has been committed, a contractor for a street improvement is justified in removing his material, if the city refuses to pay for the material, upon the ground that it does not comply with contract; providing, however, his doing so will not seriously inconvenience the city or abutting property owners. This doctrine is laid down in the Iowa case of Snouffer v. Tipton.

Liability of Contractors

In the case of Morgan vs. Salmon, an Iowa court recently decided that a surety bond given for the faithful performance of work by a contractor is held absolutely discharged from liability when the obligee fails to retain not less than 15 per cent of the value of all work performed and material furnished in performance of said contract in accordance with the terms of said bonds, said surety not having consented to such alteration.

Must Pay for Material

Under a ruling of the California Appellate Court, a manufacturing concern is liable for material supplied by an automatic sprinkler company, although the installation of the service was not complete when the property burned. The contention of the manufacturing concern was that if the automatic sprinkler equipment had been installed and in complete working order the destruction of its property could not have occurred.

Must Warn of New Perils

It is the clear duty of labor employers, the United States Court of Appeals, Sixth Circuit, held in deciding the case of Stratton vs. Hughes, to not only warn their employees of the ordinary perils to which they are exposed, but to promptly notify them of any additional dangers to which they might be subjected through the introduction of new methods of work.

Delay Not Justified

While unfortunate, the encountering of large quantities of rock which require blasting does not, in the opinion of the court, constitute a valid reason for delay in the completion of an excavation contract. Decision to that end was rendered by the Maryland courts in the action of Conwan vs. Mayer.

Allowed as Extra Work

The Sterling Engineering & Construction Company was sustained by the Federal courts in its contention that where a building plan does not indicate the material from which certain stairways are to be built, and the owner later orders them made of concrete, such work is an extra and may properly be charged for as such.



MANUFACTURERS' PUBLICITY

ASBESTOS PROTECTED METAL COMPANY, PITTSBURG, PA.—Bulletin Number 55, issued by this company, is an exceptionally well-arranged and printed booklet of 62 pages, giving views of numerous prominent industrial buildings, private residences, garages, etc., upon which their product has been used. In addition, a number of tables and other engineering data of especial value in estimating is given. A separate booklet dealing with material for roofs and walls is also published, and will prove of pronounced interest to the fraternity.

LEA-COURTENAY COMPANY, OF NEWARK, N. J.—The purpose of the corporation in issuing its well-arranged and printed new catalogue is "to set forth in a clear, concise manner a description of various types and sizes of Lea-Courtenay Centrifugal Pumps and to show that the wide range of experience, the complete shop equipment and the quality of the Lea-Courtenay pumps are elements which should be first considered by the engineer when purchasing pumping equipment for his plant."

SWEET'S STEEL COMPANY, WILLIAMSPORT, PA.—Catalogue Division No. 1 portrays the latest types of light and heavy tee rails manufactured by the corporation, together with angle bars, clips and other accessories.

The catalogue is attractively printed and contains data of great interest to engineers and architects.

POSTAL LIFE INSURANCE COMPANY, NEW YORK

Our Exchange Editor recently received the summer number of "The Postman," the highly interesting and instructive house-organ of the Postal Life Insurance Company, of New York. The Postal differs from all other insurance companies in this country, since it employs no agents, but sells policies direct to the public through advertising and correspondence, thus providing economies which policyholders receive annually in the form of guaranteed dividends, besides those contingent upon the business as are paid by other companies. The house-organ itself is distinctive, well written, and drives home to the reader the mighty value of insurance protection. The Postal's Health Bulletin, issued by its Health Bureau for policyholders, is incorporated in the publication. The current Bulletin, devoted to the subject of Mouth Hygiene, sets forth in simple language recently acquired scientific knowledge pertaining to the attainment and preservation of oral cleanliness.

SAFE HOMES



A DEPARTMENT OF "CONSTRUCTION"

Devoted Exclusively to the Interest of the Home Builder

Edited by Ralph P. Stoddard



THE late Bill Nye wrote of his experience in drilling a well at his "perpendicular" farm in North Carolina. Going up the mountain in the rear of his house, he drilled several thousand feet through the rock and found a splendid water supply, which, at some expense, was pumped and piped down to his house. After the work was completed, Nye discovered that the bottom of his well and the source of the supply was only a few feet from his house. Had he drilled horizontally into the base of the mountain he would have saved much money.

There is a lesson in this for every man who owns, rents, or ever hopes to have a home. Bill Nye's well illustrates the great power of habit.

To wear away a habit that is working great hardship upon many people and many communities in this country is the aim of this department of CONSTRUCTION. It is no easy task. A habit is like a rut in the road: the more it is used the deeper it gets and the more difficult it is to obliterate.

Bill Nye drilled his well perpendicularly because all the wells he ever had seen or heard of were drilled that way.

In many communities in the United States the homes, at a certain range of price, are built of wood, because the people who build them have seen more wooden houses than of any other kind.

That this is purely a matter of habit, without a single sound reason back of it, is best proven by the fact that in a few communities there are no wooden houses. Years ago the people started to build with permanent materials, and again habit has done the rest.

Here is another proof that habit rules the types of homes. The natural tendency would be to use the material nearest at hand, all other things being equal. That is what the pioneers in this country did and they built log houses. But to-day, we of the East and Middle West, for instance, send to the far West and the South, even to Canada and other foreign lands, for lumber, while our own sections are among the greatest producing territories in the country of stone, clay products, Portland cement, steel and iron materials, gypsum and lime.

Even if these permanent materials were no better or cheaper than wood, they should have first place in local building. But when it is considered that they actually cost less, properly installed in a building, that they unfailingly bring greater safety, greater comfort, and are in every way more beautiful and enduring, and yet wood predominates, the grip of habit upon the community is demonstrated.

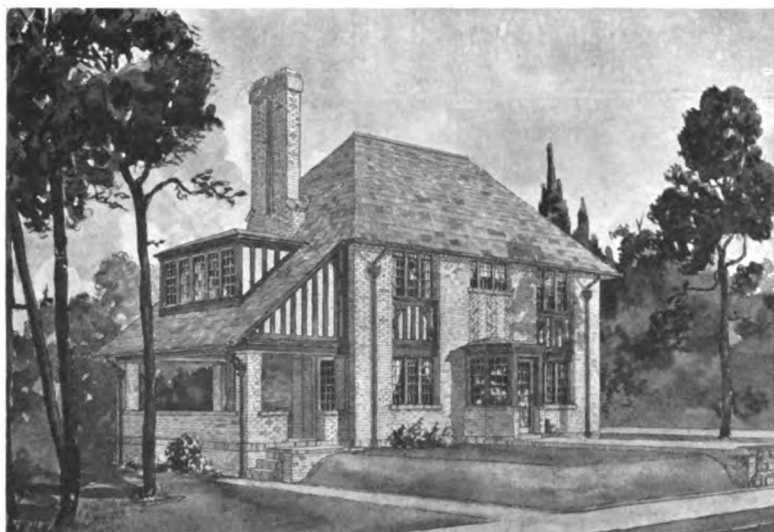
There are a great many angles to this question and many points to be considered, but Safe Homes will endeavor to put in the minds of those it reaches the unanswerable fact that homes built of permanent material positively are cheaper than homes that rapidly deteriorate and easily burn. That they are better cannot be disputed.

Back of this effort to destroy a wasteful habit and establish safe materials in American homes is a big purpose—that of reducing a great and unnecessary fire waste in this country that burdens every inhabitant.

If every person who built a house—or building of any type—would first give thoughtful consideration to the questions of materials, weighing first cost with maintenance, that there never would be erected in the world another wooden building for other than temporary use. When builders put logic ahead of habit in the matter of building, disastrous fires will cease.

Safe Homes will appear every month as a department of CONSTRUCTION. Every issue will contain several pictures of new homes of firesafe type, with floor plans, general description and estimated cost. This magazine is not published in the interest of any particular building material. It will not promote or recommend any special type of construction, but will illustrate and give estimated prices upon all the approved types employing permanent materials. Permanency, cheapness of upkeep, cold, heat and moisture proofness, sanitation and ventilation will be given equal consideration with fire safety and artistic appearance in the selection of homes for demonstration here.

By safe homes this magazine means perfect homes.



A "S-A-F-E" DESIGN

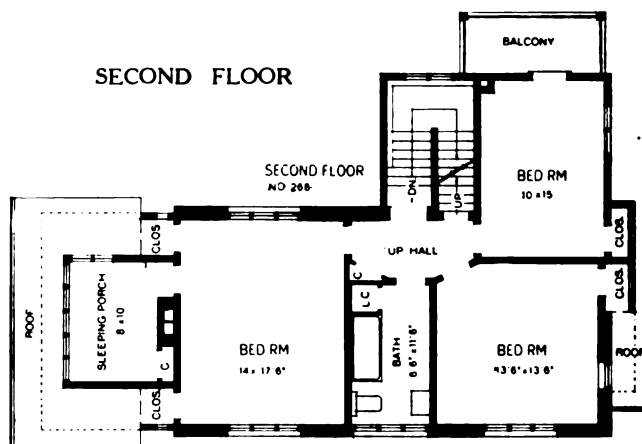
MODERN ENGLISH
TYPE

No. 268

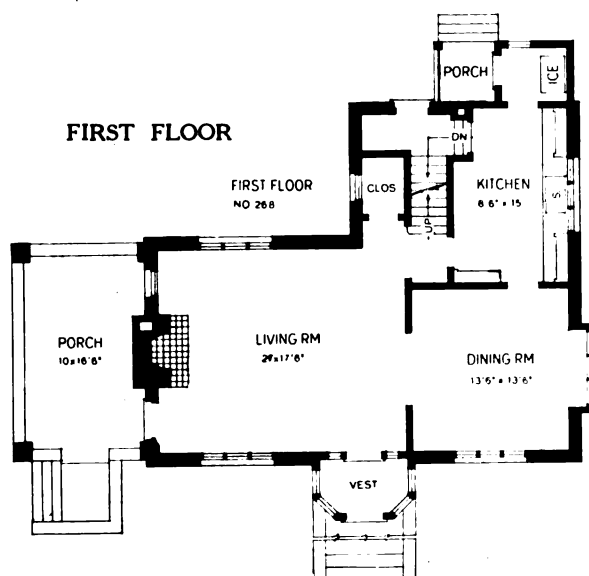
Size 47x35 ft. over all

This is known as the S-A-F-E house and was designed especially for SAFE HOMES by Architects The John Henry Newson Company, Cleveland. The owner of this house may remain complacently in his bed while his less wise neighbor's frame house burns to the ground, if he chose to do so. Not only is the structure fire-resisting, but it is fitted throughout with metal case-ment windows. These windows are a feature, since they not only add to the artistic appearance of the house and give great comfort to the housekeeper, but also are designed to protect the openings against fire. They are practically everlasting and do away with the usual expense of upkeep. The owner of this house, with a half-gallon of paint, on his day off, could do all the painting necessary and avoid one of the chief items of maintenance.

SECOND FLOOR



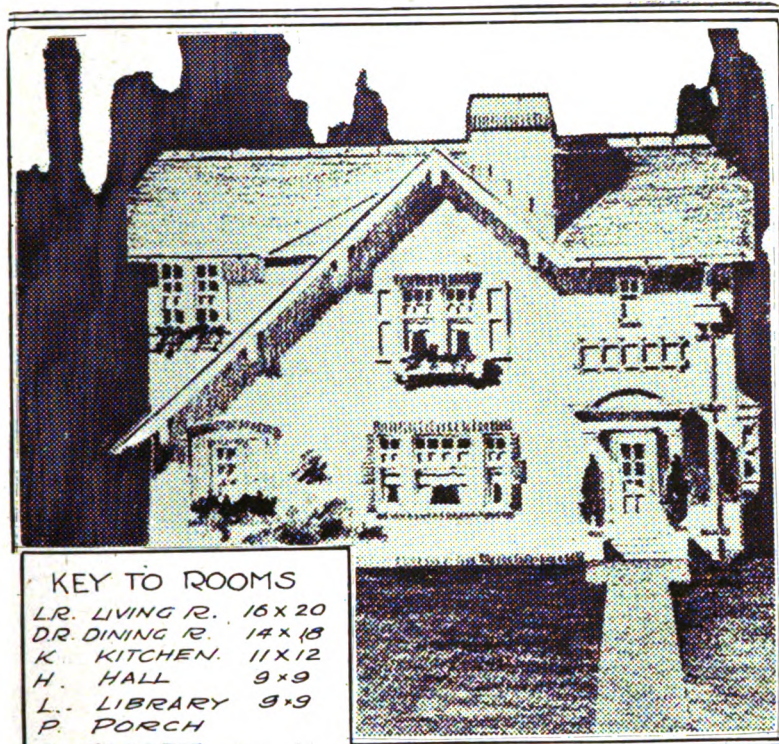
FIRST FLOOR



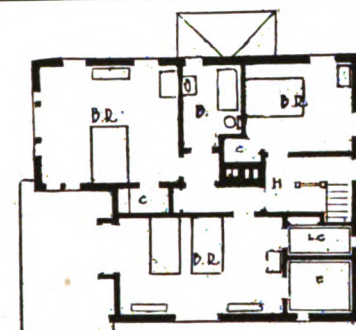
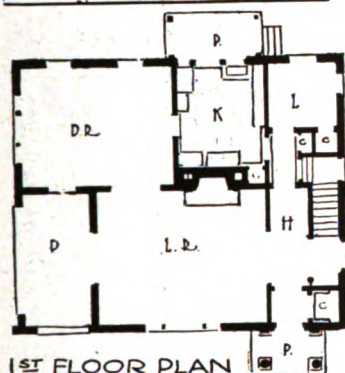
This house is to be erected in Ohio with the popular "Rug" brick, backed with common brick. Flat tile shingles are used on the roof. The porch and vestibule floors are of tile on reinforced concrete. The exterior plaster work is on metal lath, leaving absolutely nothing in the exterior to burn. The first floor is of re-enforced concrete, finished with composition flooring, in color to suit decorations. The owner will enjoy the lowest possible insurance rate upon the house and contents.

Accompanying floor plans show the splendid interior arrangement with large living room, combination stairs, making a rear stairway unnecessary, and all walls well spaced for furniture. There is a large sleeping porch and ample closet space for all bedrooms. It will be noted that all space is available for convenient use. The house can be built for \$6,000.

A FIRE-RESISTING HOME FOR \$6,800



KEY TO ROOMS
 L.R. LIVING R. 16x20
 D.R. DINING R. 14x18
 K. KITCHEN 11x12
 H. HALL 9x9
 L. LIBRARY 9x9
 P. PORCH
 C. CLOSET
 B.R. BED ROOM
 L.C. LINEN CLOSET
 B. BATH



2ND FLOOR PLAN

No. 1100

THE growing demand for houses that are safe from fire has led a number of architects to turn their attention to this type.

Among the most successful so far in evolving a small house design whose interior and exterior will meet economically the requirements of fireproof construction are Kregelius & Robinson, Leader-News Building, Cleveland.

The house is fire-resisting throughout. Exterior walls are designed to be built of hollow tiles, faced with stucco. The floors are of hollow tile, supported upon concrete beams—a type of construction used in large buildings. The partitions, also, are of hollow tile. The roof is constructed in the same way as the floors, and is covered with green shingle tiles, giving the appearance of thatch.

All rooms are of good size and well lighted. The porch, which opens off both the living and dining rooms, may be used as a sun parlor, thus virtually adding another room to the first floor. The library may be used as a breakfast room, if desired. All the chambers are convenient to the bath. The front room may be divided, if it is desired to add another room to the upstairs. Ample storage space is provided in the attic.

The architects estimate the cost of this house to be \$6,800 in Cleveland or vicinity.

It will provide a house whose owner need not worry over inadequate fire protection if he live in the suburbs.



Fire prevention is the Twentieth Century way of saying "Self-Preservation"—which is the first law of building.

THE LESSON OF THE PRESIDIO

The fallacy of flimsy construction has been brought home to the Federal government by the death of the wife and children of Maj.-Gen. John J. Pershing, when the shack in which they were housed at the Presidio, San Francisco, went up in smoke a couple of weeks ago.

The tragedy occurred while the general was in Texas commanding the troops policing the Mexican border. The fire occurring in the night, the general's wife and three children were suffocated in their beds. The rapid spread of the flames imprisoned them in the burning building, which, witnesses say, burned like tinder. A maid and guests escaped only by jumping from a second window.

Nine lives have been lost at the Presidio during the past two years as a result of the flimsy wooden shacks masquerad-

ing under the name of "quarters" in which the government houses its soldiers.

The situation of our soldiers and their families at the Presidio is one in which millions in this country find themselves to-day. They live in inflammable frame houses in districts where fire protection either is limited or entirely lacking.

What has happened to General Pershing's family may happen at any time to others.

Man is a very inconsistent being. He puts his stocks, bonds and precious gems in a safety deposit box, and then houses his wife, children, furniture and beautiful paintings, things that money cannot buy, in a tinder box, trusting to luck that, in case of a fire, he can get them out of the house before it falls on them.

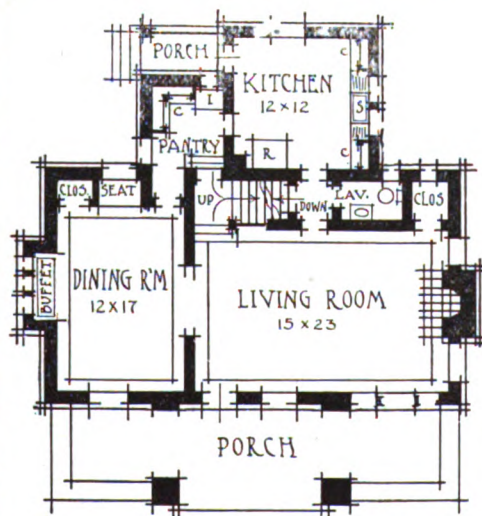


AN AMERICAN HOUSE

No. 117

This hollow tile and stucco house may be erected economically on account of its regular lines, and completed it is one of the best types of modern architecture as well as being a SAFE house to own and occupy. It is safe from the high upkeep cost and safe from fire or depreciation from any of the elements that make such rapid inroads upon the out-of-date frame construction.

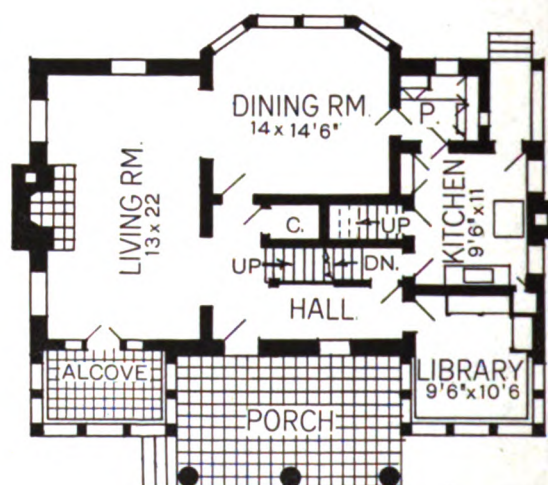
This house, 36 x 32 feet in size, has been built as low as \$3,300, using metal lath and stucco and asbestos shingles. It may be completed with walls of masonry and the highest grade of finish throughout the interior for \$5,000. The first floor plan is printed here and the second floor contains three large bedrooms, each with closets, a sleeping porch, bath and storage room. The combination stairway serves both the front of the house and the service portion. Architects, The John Henry Newson Company, report that this house has been built many times and always gives the owner the fullest satisfaction.



AN ENGLISH HOUSE

No. 143

Here is a SAFE home that is not nearly as large or expensive to build as it appears to be. The architects, The John Henry Newson Company, say that it can be completed for \$5,000. It is 41 x 31 feet in size, and has an attractive pergola porch across the front, with tile floor. It makes a handsome residence built with brick, stone trim with plaster and timber above the second floor. The half-timber effect is carried out with metal lath and stucco. On the second floor are three bedrooms, bath and sleeping porch, or four bedrooms and bath, as may be desired.



FIRST FLOOR

Second Floor
Plans
of either House
Sent on Request

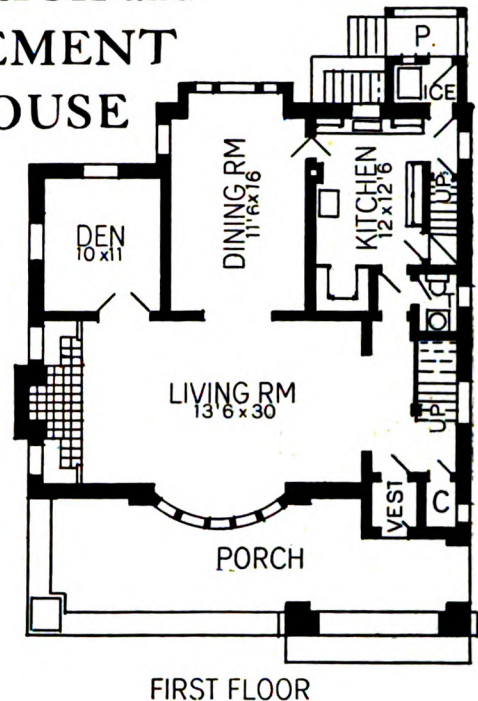




THIS house gives an opportunity for an attractive combination of brick and cement. The house contains three bedrooms, a bath and sewing room on the second floor. The first floor plan is shown here. The structural material is hollow tile and the facing bricks for the foundation and the first story are of rough surface red, with stucco direct upon the tile above the first floor. The roof is of dark red tile, making a residence secure against fire from without and one that may be maintained at the minimum cost.

With a small additional cost incombustible lath could be used for all interior partitions, and the owner would have a fire-resisting house of superior type.

A— BRICK and CEMENT HOUSE



No. 216

FIRST FLOOR

Every room in this house is light and cheerful and there is not an inch of waste space. The ground dimensions are 36 x 32 feet, and it can be built, under ordinary conditions, for \$7,000. The plans are by The John Henry Newson Company, Architects, Cleveland.

YOUR CO-OPERATION

(Continued from page 26)

are planned, and this type of structure should be made as nearly unburnable as is possible. CONSTRUCTION will neglect no opportunity to drive home to school trustees and college boards the moral obligation resting upon them of safeguarding to the last degree the lives entrusted to their care.

Protection

Public and private safeguards against fire will be dealt with in this department, and the latest and most approved methods in connection therewith set forth. The science of fire protection is most important; is moving steadily forward, and gives every promise of continuing to do so in future.

Testing Materials and Devices

Progress in the manufacture of new building and protection devices will be set forth each month, especial attention being given to tests directed by the responsible engineering, underwriting and building material trade associations. The ability of the materials to resist fire will be properly rated, together with reports from those directing the tests or witnesses thereof.

The Manufacturer

Matters of concern to the manufacturer other than those

recited in the departments previously designated will be found in the section captioned "The Manufacturer." Here trade conditions will be reviewed; important association and individual company activities set forth, business possibilities pointed out, and in general matters of importance to the manufacturer chronicled.

Fire Service

Each month a record of important fires that have occurred in different sections of the country during the preceding thirty days will be given, together with an authentic statement of the loss suffered in each case. Whenever obtainable, the cause of the fire will be detailed, together with plans for rebuilding, in so far as the latter may have been determined upon. By learning the chief causes of fires in different types of construction and industries, architects will be enabled to readily safeguard against them, advantaging thereby both the propertyowners and themselves.

The fire record will further supply manufacturers with an admirable list of prospective buyers, for the man who has recently experienced a fire is peculiarly susceptible to an appeal for the use of fireproof building material and prevention devices.

A HOME THAT CANNOT BURN

Two factors are most responsible for keeping people in the cities and away from the country: namely, transportation and fire.

The automobile has solved the problem of the former. Their low price has brought them well within the range of the average purse and good roads have made their use a comfort. They have successfully bridged the distance between the office and a home in the country.

But fire still remains a problem. Small communities may safely be said never to have fire-fighting facilities that are adequate. The result is that fire for the average suburbanite is an ever-present menace to country residents. There are some, however, who have found the solution of the fire problem. They are building their homes of fireproof construction from cellar to ridge, and are thus making themselves secure against being rendered homeless over-night.

The cost of the fireproof house is not prohibitive when it is figured upon the basis of a term of years representing the average period of residence under one roof, say twenty-five years. It does not compete with the average tinderbox house of frame, for the reason there is no basis of comparison. The tax appraisers charge off two per cent annually for depreciation on frame houses. This means a house of wood is valueless in fifty years.

A home of fireproof materials, on the other hand, may

be in first class condition at the end of fifty years—and will provide a good home for a hundred years or more with few repairs. A home of this kind may be sold at any time without the depreciation on the house having consumed the increase in the value of the land, as is the case in frame houses more than ten years old.

The house shown in the opposite illustration was designed for the Society Advocating Fire Elimination by Architects Frank B. Meade and James Hamilton of Cleveland. They aimed to produce a home for the average family and they succeeded exceptionally well. Its originality of design will distinguish it, while its simplicity adds to its beauty.

It is fireproof throughout—floors, roof, partitions, stairways, and even window frames and doors being of non-burnable materials. The only wood in its construction is in the interior trim and floor coverings. It would be possible to build a fire in any of its rooms, close the door and allow the fire to burn itself out, without danger of injury to the rest of the house.

This home may be built anywhere in the United States for in the neighborhood of \$7500. Bids of less than this amount were received for its construction in Cleveland, but a safe margin is added to allow for difficulties in obtaining certain materials in other districts.

It is the cheapest kind of a house that can be built where a permanent home is wanted.

MANUFACTURERS' PUBLICITY

Emerson Pump & Valve Company, Inc., Alexandria, Va., has issued for the benefit of contractors and others a revised edition of its catalogue, illustrating and describing the various sizes of pumps, together with the "Emerson foot valve and quick-cleaning strainer." Col. George W. Goethals, Governor of Panama and builder of the Canal, has this to say regarding the Emerson pumps: "They are giving satisfactory service at the Atlantic end of the Canal to pump out caissons one hundred and twenty feet below sea level. At the Pacific terminus we have had in use at one time as many as thirty-seven of these pumps. After making a few minor changes in connection with the foot valve piping and discharge connection to fit them for the peculiar class of work on which they were used, they have given excellent results."

Pennsylvania Fireproofing Company, Erie, Pa. An attractive booklet illustrating the Pentex Hollow Tile, a rough texture tile for exterior use, is being circulated among architects, contractors and prospective builders. The tile is unusually attractive, while its wearing qualities are in keeping with the general product of the Pennsylvania Fireproofing Company.

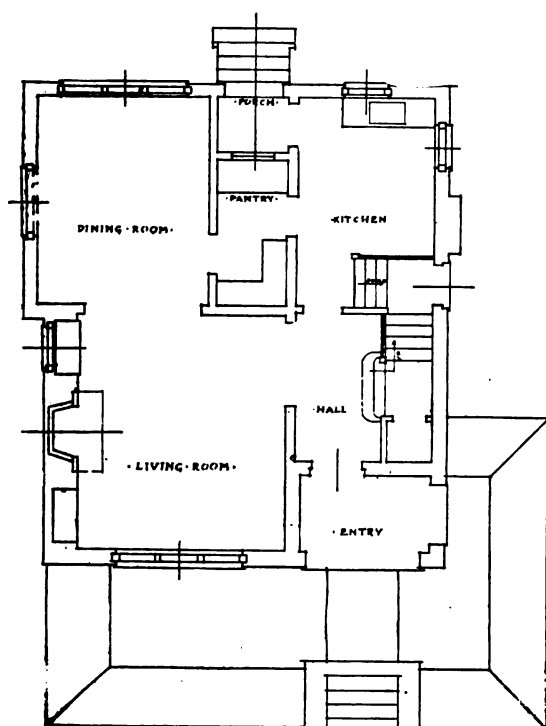
American Cement Tile Manufacturing Company, Pittsburgh, Pa. For the information of architects and property owners seeking a desirable roofing, the above-named company

has issued a most attractive booklet illustrating the benefits of its product. Bonanza Cement Tile has been used for roofing a large number of important industrial buildings, and has invariably given excellent satisfaction.

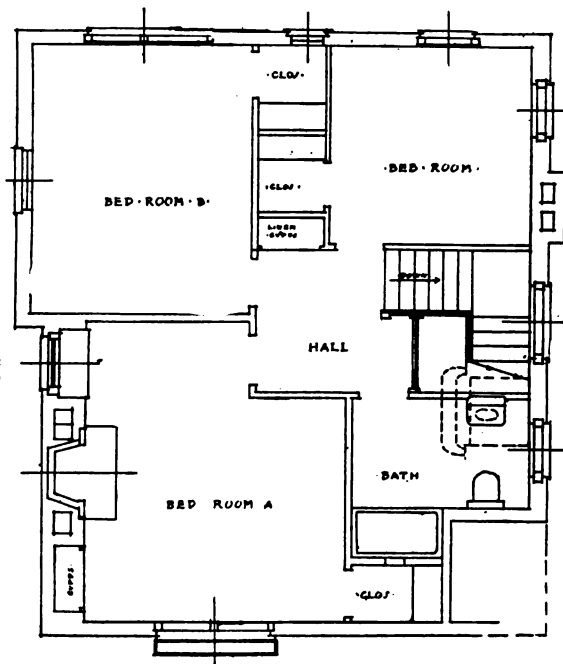
Cornell Iron Works, New York City. Among other notable products of this company is its rolling steel shutter, particulars of which are supplied in a special catalogue. The shutters and doors are designed especially for use in residences, office buildings, garages, wharfs and piers, warehouses, elevator shafts, store fronts and industrial buildings.

Bausch & Lomb Optical Company, Rochester, N. Y. Complete description of optical instruments designed for use in the inspection and testing of materials is supplied in the catalogue newly published by the above house. The reputation of the instruments manufactured by the Bausch & Lomb Company is world-wide, and is fully merited.

General Fireproofing Company, Youngstown, Ohio. "The House that Will Not Burn" is the title of an artistically illustrated and printed booklet issued by the corporation above named. Of interest to all concerned in reducing the fire waste of the country, it should be of especial value to home seekers who desire a house that is absolutely unburnable.



FIRST FLOOR PLAN
SCALE — FEET
RESIDENCE FOR THE S.A.F.E.



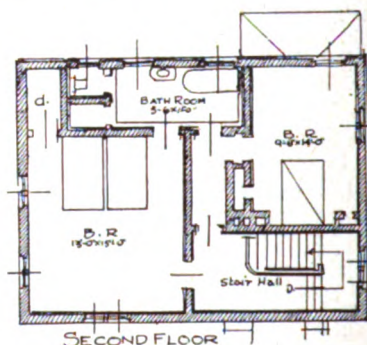
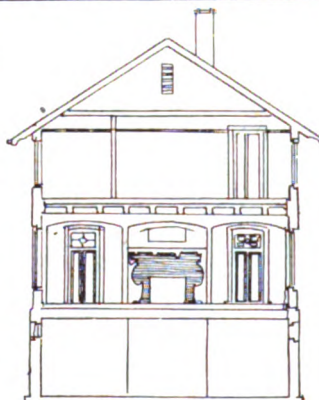
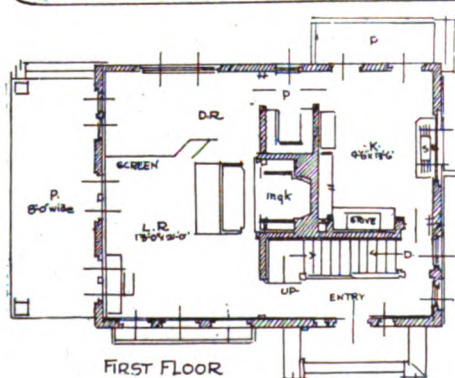
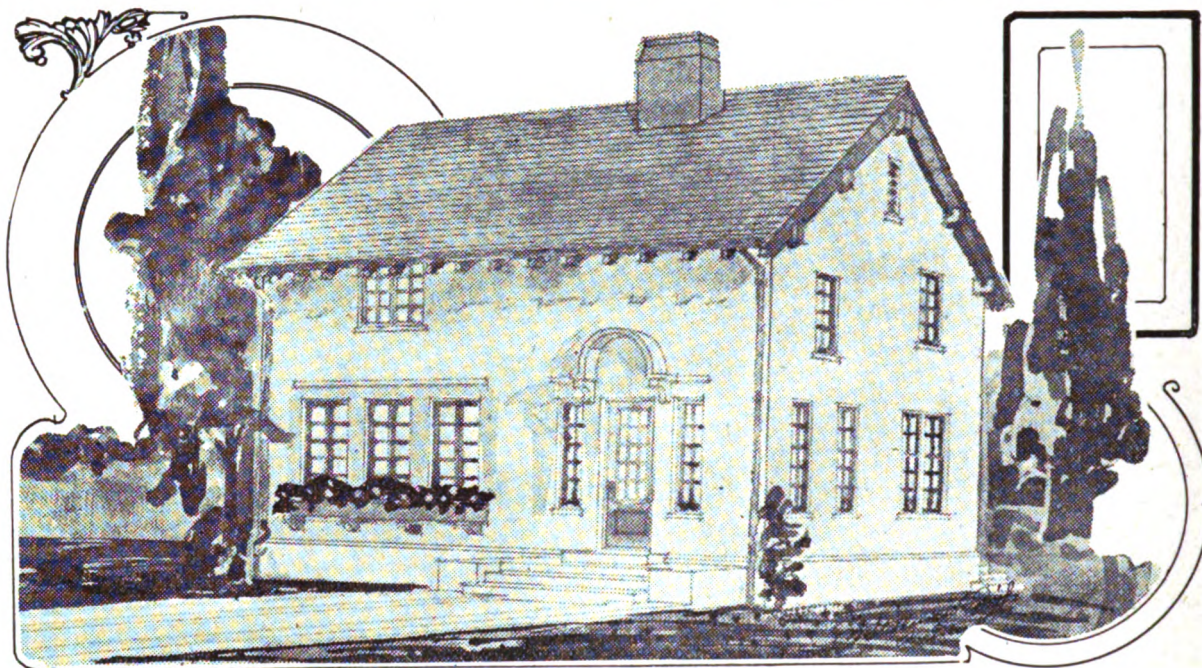
SECOND FLOOR PLAN
SCALE $\frac{1}{4}$ = 1'-0"



A HOME THAT CANNOT BURN

No. 1102





A S-A-F-E HOUSE AT LOW COST

The rapidly-increasing number of flat dwellers in cities of all sizes indicates that there is a real demand for small houses. So far this demand has not been very generally recognized by real estate operators and builders. There are practically no small houses—that is, of five rooms or less—in any but the so-called tenement districts of our cities.

In Europe much greater progress in providing for the small family in a home of its own has been made. There one will see thousands of four and five-room houses, each with its own little garden—even if the lawns have to be sacrificed to provide land. It is these small homes that give the charm to European cities and towns.

Another point in which the older countries lead us is in the use of fire-resisting materials. This accounts very largely for the per capita fire loss of a few cents, as compared with \$3.00 in the United States.

The little house shown is patterned after the typical small house on the Continent, but with its exterior localized to conform to American ideas. It embodies the best of both types. The bath room, for instance, is American, while the combined living and dining room is a feature borrowed from England.

For \$2,500, which is the estimated cost of this house, it will be seen, by a study of the plans, that it provides the maximum of comfort and convenience. Every room is large, well lighted and well ventilated. The bath room and kitchen, which in most houses are skimped, in this house are exceptionally ample. The combining of the living and dining rooms is an exceptionally good feature for a small house. In place of two small rooms, neither of which is large enough, this arrangement provides a means for using a majority of the space for either,

(Continued on following page)

Wood Has Its Uses

By Ralph P. Stoddard

Secretary, Society Advocating Fire Elimination

Much has been said on the question of whether lumber is the best, most economical material for the exterior of buildings. It is certainly passing, as are scores of other old-fashioned ideas. The cost to Americans for burnable buildings is \$1,000,000,000 a year, counting fire loss, fire department maintenance and insurance. More people than perished through the Lusitania disaster are killed every year as a result of non-fireproof building.

There is no disputing the fact that wood is the best material for baseball bats, golf clubs and ax handles. For residence furniture and even for use to a rational extent in the interior trim of the home, wood is acceptable. In fact, it is the many necessary uses of wood that make it imperative that the supply be conserved.

That timber was the most available material for the pioneers of our country is not to be disputed, but the fact that wood was the only material 300 years ago does not presuppose the fact that it is the most desirable material for building to-day. Horses and oxen then were the best means of transportation and all manner of living was primitive.

Under the feet of the pioneers, however, were minerals, oil and gas, to bring fortunes and greater comforts to posterity. Also under their feet were beds of clay and shale; quarries of stone; ore for iron and steel, rocks for lime, gypsum and cement.

The land is improved by the removal of the clay and the stone, but what land have we in America to-day that will be improved by the removal of the trees?

The number of persons in the United States who will justify the cutting down of trees is exceedingly limited.

As to the stone, clay, shale, cement, rocks and the ores, there appears to be but one use for them. They make permanent building materials and modern appliances and methods of distribution have made them available to the builder everywhere as the most economical materials in the world.

Every defect and disadvantage of the early days of

these materials has been overcome and their value proven.

To-day the dryest, most element-proof, safest and most economical house to live in has its exterior entirely of permanent materials.

A house of wood built in 1700 and painted every three years would have had expended upon it in paint alone three times its original cost, to say nothing of the repairs. Along the Hudson river, and especially in Albany, there are scores of brick houses built in the early 1700s that are as good as when new and nothing has been spent upon the exterior for repairs or upkeep. These discount the best examples of wood-frame buildings that stand in the world.

It has been said that the same class of white pine material that entered into the old Massachusetts homes can be bought in many lumber yards to-day. It was not said at what price such lumber could be bought, but this information has been supplied in a circular printed in Cleveland, referring to the tearing down of a Cleveland school built in 1869.

The joists were of white pine, 3 by 15. They cost originally \$15 and the wrecker sold the old timber for \$90 a thousand. There evidently has been some advance in lumber prices. A frame house built of \$90 lumber would cost about twice as much as one of masonry and would burn just as easily as one built of the cheapest lumber.

The public is certain to awaken some day, for no country is prosperous enough to justify a billion a year for unnecessary waste.

Within a year Boston has shaken itself free from the old bonds and taken active steps toward a safer city. In April, Chicago by a vote of 39 to 7 of its city council, added 20 square miles to its fire limits in which no frame structure of any kind may be built.

Denver, Philadelphia, Washington, Toronto, Reading, Pa., Lexington, Ky., and the greater part of St. Louis prohibit the erection of buildings with frame walls or shingle roofs.

A S-A-F-E House at Low Cost (Continued)

on occasion demands. The fact that three of its sides having windows, which may be thrown open, removes the need of a porch. However, a roof may be built over the entrance porch or a large enclosed porch may be built across the end.

This house is designed to be built of brick or hollow tile covered with stucco. The roof is covered with red or green slate, with the window frames and sashes painted to match.

Constructed in this manner, the owner will have a house

in which all the work may be easily done without a servant, one which will be several degrees cooler in summer than those of his neighbors, and one which in winter will save him many dollars in fuel burned from that necessary in a similar house constructed of wood.

In addition, his insurance will be less, and, if his neighbor's house does take fire, he is comparatively safe from worry that his own will catch from it and burn down over his head. The house was designed by Architect F. Stillman Fish, Cleveland.

Confessions of

TELEPHONE CONNECTION

A. SPECULATIVE BUILDER

ANYTOWN, U. S. A.

Contractor and Builder

Sept. 16th, 1915

Dear Bill:

Mary told me that she had received a letter from Jane in which she said that you were getting ready to build a home.

If you lived here in town I probably would be hot on your trail trying to sell you one of my ready-made houses or fix you up from my large and choice variety of stock plans. But you are out of my territory and there is no chance for me so I am going to open up and tell you some things about building.

I might just as well sign my own death warrant as to let these facts get out here in town where I am making my meal ticket--and something for the rainy-day out-of-house building, so keep this information under your hat. It is for your own use. I don't want to see you go wrong in this important step of your lifetime.

If I remember correctly you must be about thirty-two and the chances are that you will build more than one house in your lifetime. People who get started at your age usually build at least two homes. Either they get prosperous and want a better one than they could afford at first, or they are driven out of their old neighborhood by undesirable surroundings. These American cities will grow and nobody can tell who their neighbors will be a few years ahead. It may be a glue factory, a boiler shop or one of those bee-hive apartments with a dozen kids and a couple of dogs to each family.

I suppose you are going to build on the lot you showed me when I was out there last summer. That looks like a good section and one that will grow better. You should be certain that your entire allotment is restricted to single houses before you break ground. Even the double house is getting to be a curse. You may wonder at this but I will tell you why.

The assumption is that people would like to build a double house in order to have an income from half of it while occupying the other side. That is the reason the real estate men give you when they admit that they are permitting doubles on certain streets. It sounds all right but here is the rub--two rubs, in fact: In the first place, the double house is not a good investment proposition. You live too close to your tenant. If you fix up your own side just as you want it to live in your tenant wants the same frills on his own side. If Jane wanted to repaper the front rooms, or have the oak done over in one of the new finishes, the tenant would want the same.

The second reason is that ninety per cent of the renters are habitual movers. They get the fever every Spring and Fall, just as they do hay fever. They go out walking some Sunday afternoon and see a new double or an apartment going up. The wifey says, "Let's just take a look inside." That's the first stage of the disease. From that moment there is no rest for hubby and finally a place that is "ever so much better than where we are now" is located. The poor man is tricked into taking a look at it and the real estate agent hooks him on the job for a ten dollar deposit. The next thing is the order for the moving van--and you lose your tenant.

Every time you get a vacancy it means refinishing the floors and more or less painting and papering. The cases are few in which people occupying half of their own double house are not sick of the bargain and wish they had a place all to themselves. Don't mix your own home up with your real estate investments, Bill.

Right here I was interrupted in writing to talk to a woman who has been looking at one of my doubles over on the South Side. You would laugh if you could hear how I put the "English" on the argument I just wrote for you. I sat down and figured out, right before her eyes, how she could make the tenant pay for her whole house and I got a deposit on the double before she left. It is easy with the figures, but remember, Bill, I am not trying to sell you and I am giving it to you straight.

You might think you would be all right in an allotment that permits doubles if you built a single for yourself, but you are not, and this is the point I want to make strong with you. The result of the conditions I have told you about is that people move away from their doubles and they become straight tenement property. That lowers the grade and "puts the kibosh" on values.

The real estate man don't open certain streets in his property to doubles in the interest of the individual owner--not by a darned sight. He knows that he can sell a chunk of eight or ten lots to me and a lot of other speculative builders like me on which to build 'em to sell. We work off our stock plans and fill up the streets with two-family houses that are practically identical. We use red brick for the foundation and porch of one and light brick for the next and paint them different colors but they are all the same house if you look them over closely.

You can imagine what that does to the artistic effect of the property, can't you? It cheapens the whole proposition and it never fails that where these speculative houses get the first crack at a new allotment they kill it for good houses and consequently kill the chances of an advance on the land.

You just take a look at the properties in your own city that have left one or two streets open for doubles and see if it don't work out just as I tell you. Nobody knows the game like the fellow who plays it, Bill, and I am playing it to a standstill here.

There are two people out in the front office

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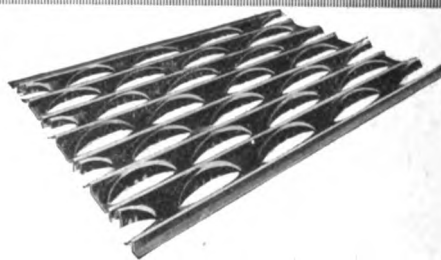
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waiting for me now, Bill, and I will have to write this letter in installments. I want to get you right on the double house idea, though, and in the next letter I will tell you why you should not build a frame house.

You probably will think I have gone crazy to say that, knowing that I never built anything but frame houses in my life--except the one I live in--but I know what I am talking about and I will prove to you that I am right.

Be sure your lot is right first and then you and Jane get your heads together and figure out just how much of a single house you actually need, without any waste room. I'll write you again soon. Best regards to Jane and the children.

Sincerely, your brother-in-law,
Jim.

AMERICA'S WASTEFUL HABIT

By James J. Hinde

The great fire loss in America resulting in such appalling sacrifice of human life and fearful waste of property demands more frequent and serious thought from the general public, until such time as preventive measures are adopted here as have long since enforced in the older countries in the world.

In the excitement of our mad rush to obtain more immediate gain and daily pleasure, we Americans are apt to forget and overlook the fearful toll we are paying to this most destructive of all elements—fire, which is directly blamable to our inclination to shift personal responsibility from our shoulders to others.

If there is any one feature in a material sense that exacts of forethought and due consideration more than others, it is the adoption of preventive measures to safeguard human lives against fire and to minimize our tremendous property fire loss.

When we stop to consider that more lives are lost annually in America by fire than all the railroads in the country kill, and that American railroads are pointed at in scorn by Europeans for their careless sacrifice of life, it cannot but make us feel ashamed of our carelessness in this matter.

The property loss by fire in some of the older countries of Europe amounts to only two cents per capita annually, while in the United States it is two dollars and eighty cents—one hundred and forty times more absolute waste.

What is the reason for all this destruction of life and property? The almost indiscriminate use of wood in building operation, particularly in residences. In Germany a frame house cannot be erected in a village of five hundred population or over. In Italy no permanent frame buildings are allowed. These and restrictive measures are in force all over Europe. In many American cities there is hardly any restriction placed on the building of frame residences, with the result that we have frequent conflagration and hourly fires. We have become so accustomed to the frequent clang of the fire alarm that we are not concerned about it unless it comes home to us, and then we cry Fire! Fire! in deep terror and

frantically try to stop what we in our cool and thoughtful moments had neglected to guard against.

Many, many millions do we spend annually in fire-fighting methods, instead of exacting precautionary measures that will minimize fire loss to such an extent that the elaborate fire-fighting equipment will not be needed.

Now that residences can be built of fire-resisting material at about the same cost as though built of wood, and upon which the upkeep expense will be from three to four per cent less annually, it will be readily understood how very much there is to be saved to this country in inaugurating a campaign of education along these lines.

The average person confuses the first cost of his home with the ultimate cost. Cheap construction or low first cost often means expense and high ultimate cost. Let us look the proposition squarely in the face and not be influenced by flashy embellishments and gaudy veneering, which, like cheap clothes, ought to attract only the near-sighted.

Cleveland has one-fourth the population of Paris, yet it pays \$125,000 more a year for maintenance of its fire department. The increased hazard makes the difference. And, what's true of Cleveland also applies to most other American cities.

In the matter of salvage resulting from losses by fire, every test is in favor of firesafe materials. The losses in buildings of firesafe materials are found generally to be confined to the building in which they originate. On the contrary, fires in frame buildings frequently destroy not only the building in which the fire starts, but adjacent buildings as well.

Every citizen pays for the privilege of having the menace of frame construction in his city, because this conflagration hazard is a menace to all fire insurance reserves and these reserves are the guarantee of the value of policies. This hazard naturally causes an increase in the rates on all kinds of building, including those that are firesafe.

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MAGAZINE is measured by the value of its service.

CONSTRUCTION represents nine months of constant investigation, research, tabulation of data, conferences and other work, part of which was an extended tour of the eastern and central western states to present the propaganda of the publication and learn what leading professional and business men related to fireproofing thought of the proposition. Prominent architects and engineers, large contractors, almost all the leading manufacturers, fire chiefs, association secretaries, municipal building officials and others were among those interviewed. The results of the trip are most encouraging, proving that the planning has been along proper lines and that men realize both the power and the need of intelligent national publicity to advance firesafe building.

You now have an opportunity of analyzing CONSTRUCTION—of passing upon the first results of all the past months' work. What do you think of it? Study it carefully—then give us the benefit of your candid thought, be it encouragement and appreciation or a kindly word of constructive criticism; one will be as sincerely welcomed as the other; all are guiding thoughts which point the way to greater SERVICE.

Fireproofing Information Bureau

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¶ Every effort will be made to develop and maintain this Bureau to a high point of efficiency.

¶ Prompt cooperation is solicited.

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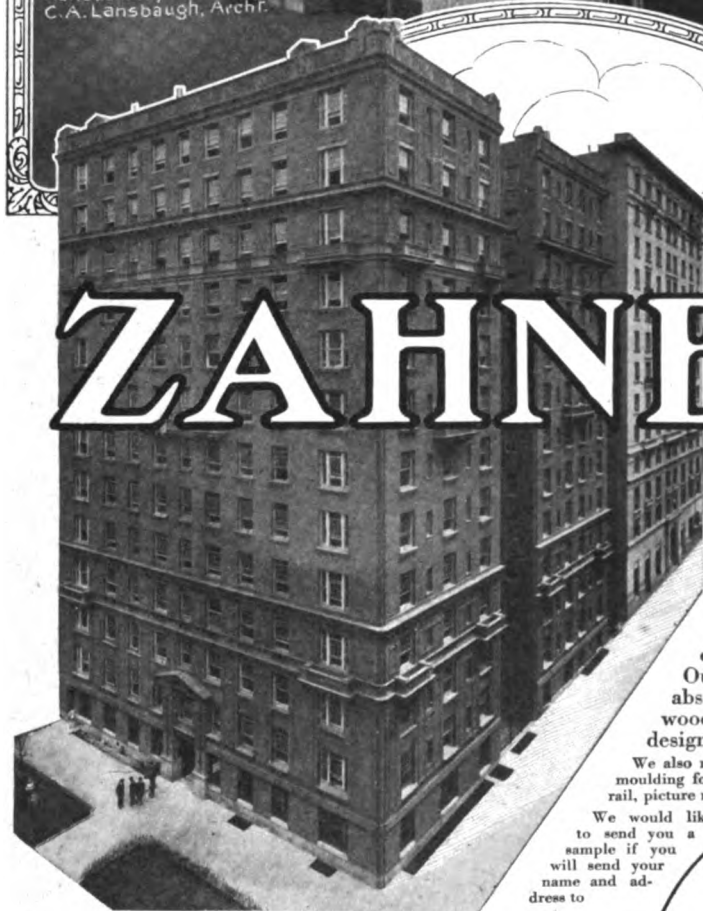
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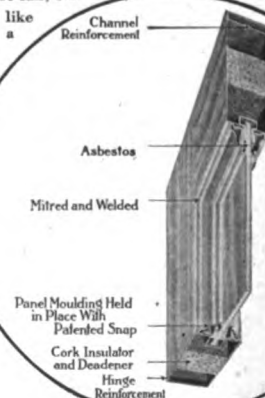
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OFFICIAL JOURNAL OF SOCIETY ADVOCATING FIRE ELIMINATION

CONSTRUCTION

WITH A
DEPARTMENT DEVOTED TO
SAFE HOMES

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The House Indestructible.

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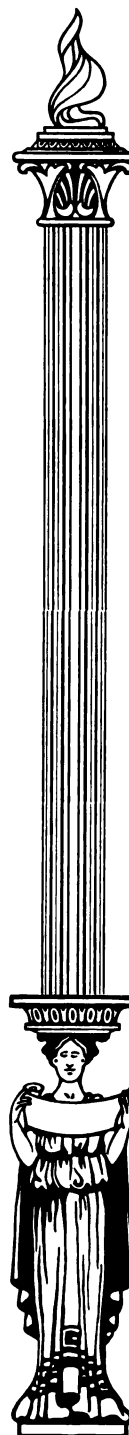
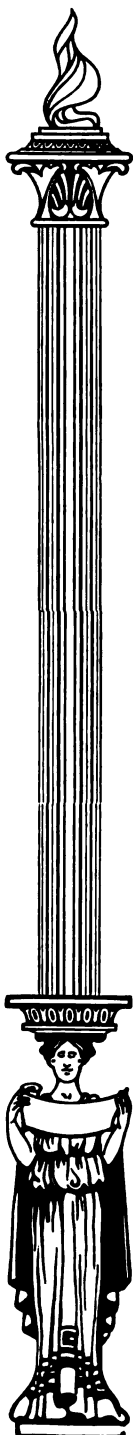
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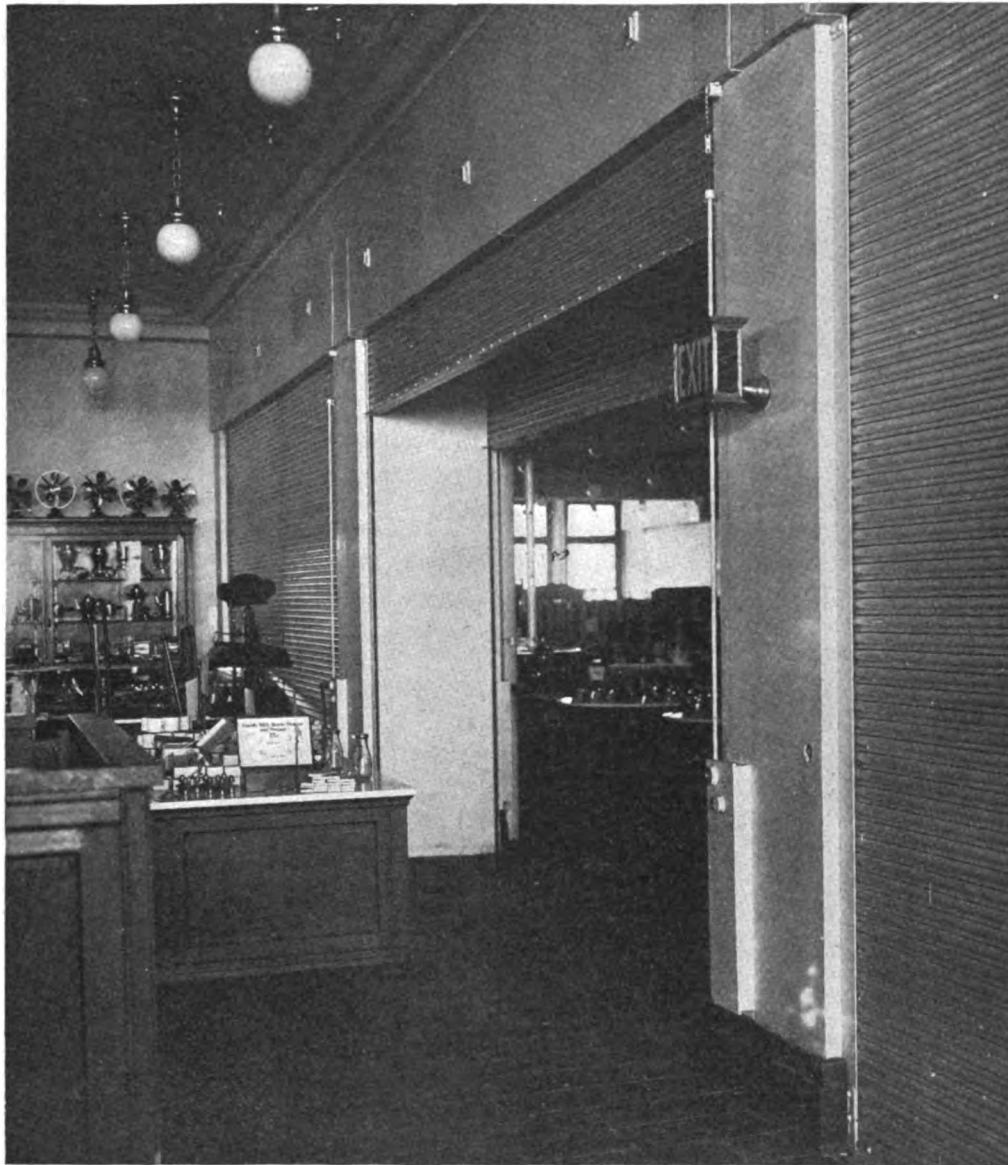
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AMBLER ASBESTOS CENTURY SHINGLES

consequently—a roof covered with them becomes immediately FIRETIGHT and secure against sparks and flying brands. It makes the ONE roof for the builder who wants to be SURE—and SECURE.

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There is no cost of upkeep—because there is no wear or tear. The roof cannot leak—there is no crevice for the wind to work in and rip the shingles loose. The tightest freeze will do no harm. The sun cannot fade the soft colors of the shingle and you'll never have to paint or dip them.

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CONSTRUCTION

WITH A DEPARTMENT DEVOTED TO
SAFE HOMES



VOL. I

NOVEMBER, 1915

No. 2

The Menace of the Wood Shingle Roof

***Municipal Officials and Property-Owners Must Unite
to Destroy the Greatest Single Fire-Hazard in America***

THE inflammable roof!

In the analysis of one of the greatest problems which confronts the American public to-day—that of the annual fire loss—one fact stands out clearly above all others—the inflammable roof constitutes the greatest single fire hazard in America!

The proof of this statement has assumed gigantic proportions and is being added to daily, as reports come in from every section of the United States and Canada—"Entire Town Destroyed by Fire," "Flying Brands Set Fire to Thirty Houses," "Conflagration Wipes Out Residential Section," "Hampton Beach, N. H., Destroyed by Fire"—Truly the shingle roof route to destruction is widely advertised!

Conflagration Losses and Hazards

With only a passing consideration of the many comparatively small fire losses caused by the communication of fire from one building to the roof of another, the question of staggering conflagration losses immediately presents itself as of paramount importance.

It has been said that a conflagration resembles a chemical reaction in many ways. This is true. A careful analysis of a conflagration shows four elements to be present: a spell of hot, dry weather; high winds; a preliminary quick, hot fire—and inflammable roofs.

Obviously, if at least one of these elements is removed, the conflagration cannot take place. Naturally the elements of weather cannot be controlled. The quick, hot fire can only be prevented by general un-

burnable construction which will not become a reality until the many fire traps which cover our country rot; or, according to the law of probability, burn; but the roofing element can and must be so changed in character that it will no longer combine in the general reaction—thus making the conflagration impossible.

The absolute inability of any section, where shingle roofs are prevalent, to resist the onslaught of a conflagration is pitiable; the fire blazes hotly and the burning embers are carried by the wind to start several fires in different sections. Almost immediately the fire department is rendered helpless; two or three fires can be coped with at one time, but when from ten to thirty fires start at once, and each contributes to the general disorder, there is no remedy.

Every year the volume of the American fire loss is increased from ten to forty percent by the burning of communities or sections of communities, the spread of the flames being primarily due to improper and hazardous roofing conditions. For the purpose of graphic illustration of the real cost of inflammable roofing materials, a careful consideration of some of these great losses seems advisable and will prove of interest.

Conflagration Losses

Massachusetts, and in fact the entire country, is now using the Salem conflagration as a strong argument against the continued use of the wood shingle.

The Salem fire started in a frame leather factory which was roofed with wood shingles, scattering the blazing shingles, which were carried to surrounding

buildings by the high winds, thus starting a general conflagration. Many witnesses saw shingle roofs burst into flames long before the fire reached them, ignited by the great heat generated by the conflagration. House after house blazed as the rain of sparks fell on the timber-like shingle roofs, setting fire to them.

The responsibility of the shingle roof for the Salem conflagration was recognized immediately by local authorities, and the city council promptly passed an ordinance prohibiting the use of such roofs thereafter.

The day the Salem conflagration ended, at the water's edge, the "Salem News," the leading daily of the city, said in its editorial on the fire:

"Any view of the conflagration which ignores the virtual universality of the wooden shingle will lose sight of one great contributing factor to the development of the fire. These shingles were so many invitations, in time of drought, to fire. With their curled and jagged edges pointing upwards, they offered lodgment to the flying embers, borne in varying volume far beyond the confines of the zone of fire. In plain words, wooden shingles have cost the city of Salem several million dollars. In the days of rehabilitation to come, when pros and cons are weighed, and discussion concerns itself with a variety of measures, remedial or normal, this signal fact is bound to be recalled."

Within the past ten years, two serious conflagrations have occurred in Hot Springs, Ark. In both instances the spread of the flames was mainly due to the shingle roofs of the dwellings in and near the fire limits.

The territory burned over in the first conflagration, February, 1905, consisted of 122 acres. On September 5, 1913, the second conflagration burned over an area of 133 acres, including about 56 acres of the rebuilt section, and only ceased because the wind died down, thus stopping the carrying of brands to shingle roofs and offering an opportunity to check the fire.

The fire hazard still exists in Hot Springs, and they are again putting shingle roofs on houses outside the fire limits—even in that section which has twice burned over! Comment is unnecessary.

The great conflagration at Bangor, Me., early in 1911, was commented on in the National Fire Protection Association report as follows:

"In the area swept by this conflagration the structural conditions were not good, the congested value section being almost devoid of the ordinary fire stops, such as solid fire walls (i. e., without openings) and parapets, protected window and door openings. There were practically no fireproof or mill constructed buildings, neither buildings equipped with automatic sprinklers, nor other effective fire protection in the burned area. There were *many shingle roofs* in the congested value district, and in the residential district surrounding it."

The loss here was \$3,500,000.

The entire premium income of the fire insurance

companies in Maine during 1911 amounted to about \$3,000,000, with aggregate losses in the same period of \$4,000,000, or 133 percent. Add to this the customary 40 percent for expenses and an idea may be had as to what wood shingle roofs cost the insurance companies and, in turn, the general public.

Conditions in Providence, R. I., invite a disastrous conflagration. Many wooden structures with wooden shingle roofs line the narrow streets even in the fire district. At any time a conflagration could find several direct pathways into the heart of the business district. In the Atwell's avenue section nearly fifty thousand people are housed in wooden buildings packed closely together and roofed with wooden shingles. At least 85 percent of all dwellings in Providence have wood shingles.

Boston is regarded as supplying the greatest fire hazard of any city in the United States; this notwithstanding its admirable high-pressure water service and well-disciplined fire department. The menace is caused, not by the buildings in the downtown section,



The asbestos shingle roof stopped the spread of this fire

but by the residence properties principally in the suburban communities of Somerville, Dorchester and Cambridge. While separate municipalities, these centers so closely adjoin Boston proper as to constitute practically part of the city. The old type of detached residence has given place to the three-deckers of the industrial workers, solid rows of these stretching around in all directions. Underwriters are clearly aware of this great conflagration hazard. A fire, starting under the right conditions, would spread to the *wood shingle roofs* and wood gingerbread ornamentations so quickly as to become unmanageable, burning out the entire section and seriously threatening the city itself. Owing to this fact, one of the largest companies in the business has recently reduced its liabilities in this section to the extent of \$1,000,000—one-third of its business in that district, which indicates its opinion.

In every farming district, where fire apparatus is scarce and the wind has open range, the hazard of the

shingle roof is especially severe and should by all means be eliminated by encouraging or, if necessary, enforcing the use of unburnable roofing materials.

Building Codes

The various cities of the United States and Canada have incorporated in their building codes, restrictions against the use of inflammable roofing, but this restriction almost invariably covers only that section of the city which is included in the fire limits. To prohibit the use of wood shingle or other types of inflammable roofing only in certain sections of a city is a grave mistake. While it is true that conflagration seldom, if ever, gains headway in a section where the buildings are of brick, stone or concrete, the fact remains undisputed that practically every city in America is surrounded by many dwelling houses and other structures usually built of inflammable material, and the greater part of which are roofed with wood shingles. The conflagration starts in such sections as these, and, spread by flying brands, rapidly assume such proportions, that the better built section within the fire limits of the city is in great danger of being entirely destroyed. A strong wind will carry blazing shingles and hot brands to a considerable distance, a convincing proof of this statement being furnished by the Salem fire. Here the flying brands traveled on a high wind from Salem, across the valley to South Salem, there igniting the shingle roof of a schoolhouse and starting the second fire which resulted in the destruction of all property to the water front, including the great Naumkeag Mills (except the properly built and roofed storehouse). This loss of millions of dollars would have been avoided if many of the roofs had been covered with fire-resistive shingles.

Another, and scarcely recognized hazard of the inflammable roof, is a danger of its ignition by sparks from the chimney of that or a nearby house.

Statistics of fires in the city of Birmingham, Ala., show that from 1908 to 1912 over 40 percent of the fires were caused by sparks on roofs. The fire table is as follows:

	OLD CITY.		GREATER BIRMINGHAM.			Total.	Per Cent.
	1908	1909	1910	1911	1912		
Cause of Fire:							
Sparks on roofs.	176	199	418	510	633	1936	40.7
Unknown.....	72	85	141	173	229	700	14.7
Carelessness....	68	103	158	150	154	633	13.3
Defective Flues, etc.....	33	45	79	72	64	293	6.2
Soot.....	29	29	66	93	69	286	6.0
Electrical.....	12	12	31	40	35	130	2.7
Incendiary.....	9	24	26	23	31	113	2.3
Gasolene.....	6	4	17	24	7	58	1.2
Miscellaneous...	79	58	152	151	174	614	12.9
Total fires....	484	559	1088	1236	1386	4753	100.0

On April 25, 1912, in Birmingham, the frame residence at 813 West 49th street was set in flames by sparks from a defective flue, igniting the wood shingle roof. Flying brands (burning shingles) ignited the shingle roofs of thirty-four houses in the neighborhood, causing serious damage.

As a result of these conditions there is now an anti-shingle roof ordinance in Birmingham. Referring to strenuous attempts of the lumber interests to have this ordinance repealed, a high authority in Birmingham writes to CONSTRUCTION under date of September 15, 1915, and says in part:

"If you refer to the anti-shingle roof ordinance passed some time ago, will say that the lumbermen did make an effort to have this repealed, but the shingle ordinance still holds good. Nowhere in the city of Birmingham can a wood shingle be put on a roof where as much as 25 percent of the roof has been damaged. No new roofs can be put on except with non-combustible material. The writer is quite sure that this ordinance requiring non-combustible roofs in Birmingham will never be repealed."

The following ordinance was passed by the city of Birmingham largely on the insistence of the fire underwriters, who threatened to withdraw from the city unless such protective measures were enforced.

Be it ordained by the Board of Commissioners of the City of Birmingham, that Section 1 of Ordinance 185-C, approved September 24th, 1913, and entitled "An Ordinance to Establish Fire Limits, or District No. 3, and concerning the construction and repairs of roofs therein," be and the same is hereby amended so as to read as follows, viz.:

Section 1. There is hereby established a Fire Limit or District to be known as Fire Limit No. 3, which shall embrace all of the territory included in the corporate limits of said City of Birmingham.

No building or part of any building or structure in said Fire Limits No. 3 shall after the 5th day of February, 1915, be covered or repaired with wooden shingles; Provided, that any roof is deteriorated or damaged not more than 25%, such damaged or deteriorated portion of said roof may be repaired with the same kind of roofing as the undamaged or undeteriorated part. No wooden shingles shall be placed on any roof of any building or structure, within the corporate limits of the City of Birmingham, without obtaining first a permit for same from the city Building Inspector which shall specify the repairs to be allowed. Approved Feb. 3, 1915.

In Canada the building laws of most large cities call for fire-proof roofing in the business sections, but ignore the danger of shingle roofs in residential areas where the conflagration hazard is high.

About 3 years ago the city of Winnipeg passed a by-law requiring that in the future all buildings should be roofed with incombustible materials. This was an excellent measure, but, like many other good things, its life was short. It was repealed in *one week* because of the strenuous protest of local wood shingle dealers.

G. Gordon Complin, a roofing authority in Can-



Firesafe church at Emporia, Kan. A typical asbestos shingled roof and stucco exterior

ada, said in reference to the roofing question there:

"Our country's supply of minerals is practically unlimited. Our supply of timber, on the other hand, is dangerously limited. *Can we, therefore, not put what timber we have to much better use than saving it to kindling wood size and arranging it in convenient form for burning on top of our homes?* This is practically what wood-shingle roofing amounts to.

"Continuing on the subject of national economy, let us consider what it means to us as a nation to use inflammable roofing. *Insurance statistics prove that a large percentage of fires originate on the roof.* Now, fire means waste and waste means loss. It matters not if the building is insured, the loss is just as great, the only difference being that it is borne by a company instead of an individual, and the company, of course, collects it from the public in the form of insurance rates. The rate of insurance is determined by the amount of our fire losses—the more fires we have the higher the rate. Fire insurance, in fact, may be described as a gigantic system whereby the losses of individuals are divided among multitudes.

"Manufacturers and retailers have to pay insurance.

They must add this to the price of their goods. The consumer pays it. The higher the insurance rates, the more you pay for your boots, your clothes, your food. If, therefore, our national fire loss could be reduced, every individual would directly benefit by reason of a reduction in the cost of living. The universal use of fireproof roofing would aid enormously in bringing about this result.

"The National Fire Protection Association is authority for the statement that every day, in the United States and Canada, some one's home is destroyed or the roof burned off it by the ignition of its wood shingles by sparks from its own chimney. Wood shingles not only ignite easily, but their flying, burning brands are a menace to every surrounding building and its inhabitants. The recent fire in Salem, Mass., for instance, with its loss of life and property, might easily have been averted if some few houses had been roofed with incombustible shingles instead of wood shingles. It is a comparatively well-known fact that our per capita fire loss is enormously greater than that of any other civilized portion of the globe.

"Are we as a nation going to allow this stigma to

continue to rest upon us? Are we going to continue literally burning up our money while we fill columns in our newspapers howling about our 'high cost of living?' We think not. There will come a day of awakening, a day when fireproof roofing will be universal. The wood shingle firebrand will be banished forever, by legislation if by no other means, although it will cry shame upon our intelligence if we have to be forced by legislation into an action which the dictates of common sense should lead us to take."

The lumber interests are now busy attempting to block the wheels of progress at Shreveport, La.

The following letter was recently received:

SHREVEPORT, LA., Sept. 21, 1915.

Construction Publishing Company, New York.

GENTLEMEN:

Re-New Building Code, Shreveport, La.

Am pleased to see your letter of Sept. 18th and note your attitude towards the wooden shingle.

Am enclosing copy of the section of our proposed Code relating to shingle roofs, and am satisfied it will meet with your approval, and it would be a favor to me to have a letter from

you endorsing same for presentation to the Council, along with many others from competent authorities.

It is with some surprise that I read of many other cities "Prohibiting wooden shingles within Fire Limits." We have not allowed wooden shingles within the Fire Limits for 15 years; what we want is to bar them within the Corporate Limits.

Yours very truly,
STRUBBE McCONNELL,
Building Inspector.

P. S.—The new Code is practically a revolution as compared with the old, and there will be a great battle to get some parts of it adopted; already the shingle mills have combined to fight Sec. 80, so anything you can do to help and any information you can furnish will be greatly appreciated.

Section 80 of the proposed code reads as follows:

Part XV. Roofs and Roof Structures

1. All buildings hereafter erected or recovered, except as given below, shall have roof coverings of approved standard quality, such as brick, concrete, tile, slate, metal, asbestos shingles, built-up roofing felt with gravel or slag surface, or other good roofing which has been tested and approved by the Building Inspector.

Exceptions: Dwellings and frame buildings within the Fire



Asbestos shingled roof on residence of Raymond A. Joroleman, Flower City Park, Rochester, N. Y. Architect, Chas. W. Eldridge

Limits, and all buildings outside the Fire Limits.

2. The quality of roofing for dwellings, frame buildings and other buildings exempted above shall be as required in paragraph 1, or may be of a lower grade, provided it meets the requirements indicated in the definition of approved fire-resistive roofing, Section 7, par. 7.

NOTE: The grades of roofing mentioned above shall be determined by the Building Inspector, and a list of approved roofings of each class posted in his office for public inspection.

3. No uncovered tar, felt, rosin, woodwork, or other combustible material whatsoever shall be exposed upon any roof or appendages within the corporate limits.

4. The wooden planking and sheathing of roofs shall not in any case extend across side, party or fire walls.

5. Any roof having a pitch of over 60 degrees, placed on any building over 40 feet high, except towers or church spires, as specified in Sec. 188, shall be constructed of iron or steel frames protected with fireproofing material not less than $3\frac{1}{2}$ inches thick and filled with fireproof material not less than $3\frac{1}{2}$ inches thick covered with approved roofing.

6. All flashings shall be made of metal properly incorporated with the roofing material. Copper flashings are recommended.

7. The top and sides of dormer windows shall be protected the same as the roof.

8. This section shall not be construed to prohibit the repairing of a wooden shingle roof, provided the building is not increased in height nor area, but the renewal of such roofs is forbidden. Existing shingle roofs, if damaged by natural causes, such as wear and tear, so that as much as 10% has to be made new, shall be entirely covered with approved fire-resistive roofing. Existing shingle roofs, if damaged by accidental cause, such as fire or storm, and are otherwise in good condition, if as much as 25% has to be made new, shall be entirely covered with approved fire-resistive roofing.

9. On or before Jan. 1st, 1921, any and all roofs within the Inner Fire Limits now covered with wooden shingles shall be entirely covered with approved fire-resistive roofing. On or before Jan. 1st, 1926, any and all roofs within the corporate limits now covered with wooden shingles shall be entirely covered with approved fire-resistive roofing.

This code has been submitted to the National Board of Fire Underwriters and has the warm approval of its staff of engineers.

The city of Knoxville, Tenn., has shown remarkable progress along the lines of proper protection against fire in the preparation of its present building code. The severity of the roofing hazard has been recognized in Amended Section 15 of the Code as follows:

"Every building hereafter erected within the 'outer fire limits' or within the 'non-combustible roof limits' shall have an incombustible roof covering, and no existing wooden shingle roof, if damaged more than 20 per cent, shall be renewed or repaired with other than incombustible roof covering."

The designation of the fire limits in Knoxville is excellent and worthy of comment. The "inner fire limits" cover the blocks in the most congested and important section of the city, and here the regulations impose consistent firesafe construction and practice. This section is contained within the "outer fire limits" which cover the entire business district, and calls for strict adherence to excellent safety regulations. The

roofing hazard, with its great danger of providing paths for a conflagration to force its way into the business section, has been recognized by the establishment of "non-combustible roof limits" which reach almost to the corporate limits of the city and cover all the closely built residential section. Here the roofing hazard has been directly and forcibly dealt with, as shown in the above section of the Code, and Knoxville is to be commended on the excellent progress made. Other cities will do well to follow this plan of "non-combustible roof limits" as a first important step toward the conservation of property and life.

The code of Jacksonville, Fla., prohibits the wood shingle as follows:

All buildings within the *city limits* shall be roofed with metal, slate, tile, slag or gravel or other *equally fireproof* material, which has been approved by the National Board of Fire Underwriters. A gravel roof must consist of not less than four pounds of gravel per square foot and a slag roof of not less than two and one-half pounds per square foot, both to be laid over some suitable waterproofing material and secure to it by a suitable adhesive.

Lynn, Massachusetts, has an ordinance which not only prohibits the further use of wood shingles, but provides that in about fifteen years all roofs must be covered with fire-resisting materials.

Section 69 of the Building Code of Houston, Texas, provides that every building and the tops and sides of every dormer window thereon, within the city limits, shall be covered and roofed with tile, slate, tin, gravel, composition or other incombustible roofing, as the Building Inspector may authorize. Nothing in this section shall be construed as prohibiting the repair of any shingle roof, providing such repairs do not exceed 25 per cent of the cost of the roof.

Other progressive cities, towns and villages have legislated against the wood shingle roof. They have learned the lesson of their own losses, or those of their neighbors.

The Insurance Viewpoint

There are undoubtedly no keener judges of fire hazards than those engaged in the business of fire insurance. Their judgment is based purely on business reasons and must, therefore, constitute the cold-blooded dollars-and-cents viewpoint. Following are their opinions and actions in this matter:

Mississippi Inspection and Advisory Rating Company has recently issued an amendment in which a credit of 20 per cent is given from the basis rate of building having non-combustible roof, as an incentive to property owners to use roofs of this kind.

Kansas Inspection and Fire Prevention Bureau has recently issued a booklet in its "Pointers" series, entitled "The Aviation of the Hot Shingle," in which is said in part:

But, you say, "How about that *Shingle Roof*?" Well, it is

a special menace in the larger value mercantile district, and should be forced out by ordinance, as it has an "open armed" tendency to a flying fire brand from even an insignificant bon-fire, as at Chelsea, Mass., or a la Bangor, Me., when the burning shingle aviated half a mile to a shingle-roof church; or, coming closer home, in Atchison's recent fire loss "contribution" a flying brand fired a church—in fact, seven fires broke out simultaneously from aviating brands. This "bird-fire" is bad business to have around shingle roofs.

These lessons would teach the individual and city:—

That—

- Walls, of solid construction to be maintained.
- Parapets, of standard heights.
- Window and door openings thoroughly protected.
- Fire proof buildings—are good "barriers."
- Mill-construction—remember is slow-burning.
- Ordinary brick and stone construction controlled under good Building Ordinances—and enforced.
- Automatic sprinkler equipments greatly reduce fire loss—best modern protection.
- Shingle roofs, in mercantile districts especially, are a severe menace.

The difference in premium on your risk will well-nigh pay the difference in cost of a good, metal, slate, tile or approved composition roof, when compared with the

Inflammable Shingle Roof.

In many of the Special Hazard risks, i. e., manufacturing properties, the Schedule for rating reads:

"If shingle roof, charge (per hundred) - - -	.25"
For example, \$5,000 is placed on bldg. at 25c.	
excess in rate for shingle roof, or total per annum of - - - - -	\$12.50
For \$7,000 on contents in this warehouse, we also have in excess per annum for shingle roof - -	17.50
Total annual charge on the hazard of shingle roof is - - - - -	\$30.00

If \$30.00 per year for 5 years saves \$150.00 towards equalizing the differential in cost for a superior non-combustible roofing, and your property has been in the meantime a safer risk from the "bird-fire" or spark hazard, you have made a good investment, see!

Now, on the other hand, rating schedules recognize shingle roofs in the mercantile class by a percentage charge which varies from 10 to 15 cents.

Virginia Inspection and Rating Bureau: "The underwriters in the Southern field look with disfavor upon shingle roof construction, and feel that all influence should be brought to bear against the erection of shingle roof buildings. In this territory shingle roof buildings carry a higher rate than buildings covered with metal, slate or approved composition."

South Eastern Underwriters Association: "We are naturally opposed to the use of wood shingles as a roof covering anywhere, but especially in cities where the hazard from sparks and flying brands, and the conflagration hazard, are the most to be feared. Our at-

titude is clearly indicated by the rates applicable to buildings covered with wood shingles and those using incombustible roof coverings, the penalty charge for the shingles varying from five to twenty-five cents with the classification of the town and the character of building covered. In most instances, however, the penalty is from fifteen to twenty-five cents."

Chicago Board of Underwriters of Chicago: "This Board does not advocate shingle roofs, but they are not prohibited on dwellings; on the other hand, a credit of 10 per cent is allowed for non-combustible roof as listed by our laboratories. On risks rated under our Analytic Schedule a charge is made of 20 per cent, and under the Manufacturing Schedule of 25 per cent."

Board of Fire Underwriters of the Pacific: Deficiency charges are imposed as follows (for the use of wood shingles):

Frame or brick electric power plants. . . . .	.20 and .25
Brick buildings, 25 per cent of key rate applying.	
Frame woodworkers . . . . .	.50
Canneries and packing houses. . . . .	.15
Apartment houses, 25 per cent of the key rate.	
Mining plants . . . . .	.25
Laundries . . . . .	.15
Rice mills and meat-packing houses. . . . .	.25

Underwriters Association of the Middle Department: "Where (wooden shingles) found in evidence we exact increase in rate over and above rate which would obtain on risk with fire-resistive roofing of from 5 to 25 per cent, depending on the class of risk as to occupancy."

Suburban Fire Insurance Exchange: While this body (which makes the rates for Long Island and the suburbs of New York) make no general penalty for the use of wood shingles on any but otherwise fire-proof houses, it is understood that there is a strong agitation on the part of members to follow the general practice of other similar bodies throughout the country.

Underwriters Association of New York State: "We are most decidedly opposed to the use of wooden shingles as a roof covering. We are endeavoring as far as possible to secure the adoption of Building Codes and Ordinances that will prohibit the use of wood shingles, especially in the more thickly built up portions of cities, towns and villages. Many communities have within the past two years adopted such restrictions. It is not necessary for us to comment on the part played in great conflagrations in this country by combustible roofs, and of course the shingle roof is the most combustible.

"In reference to shingles as a rating factor let us say that under our dwelling schedule a penalty of 5 cents per \$100 on a three-year policy is charged for the presence of a shingle roof on a dwelling. The



Slate roof on residence of John T. Gillespie, Morristown, N. J. Architect, Harrie T. Lindeberg

charge is not exactly uniform in connection with the rating of other classes of property. In a general way it runs from 10 cents to 15 cents per \$100 per annum."

The National Viewpoint

Of further interest in this connection are the opinions and activities of various associations and individuals interested in the reduction of the fire waste.

George R. Williams, president of the *Georgia Fire Prevention Society*, which has been active in the war against the wood shingle, makes some very interesting and apt comments on the situation to-day:

"A specific effort is always made in every town inspected to induce the city councils to adopt such an ordinance as will prevent the future use of any wooden roof, and I presume that the only objection ever made to accomplishing the desired result is through the manufacturers of shingles, which is perfectly natural, perfectly legitimate, and is due largely to themselves. We try and answer this argument that it appears very difficult at the present time to secure really a pure heart No. 1 shingle, and when they can be secured the cost of same is practically that of a non-combustible shingle, which naturally tends to prevent the spread of fire, but also gives the owner or occupant a lower insurance rate.

"It is always very hard for any artisan to reconcile himself to developments in his particular line of work which is conducive to lessening the use of human hands. The linotype

has perhaps done away with many old-fashioned printers; the newspaper folding machine has likewise interfered with boys and girls who used to perform this work; the safety razor has no doubt materially injured the barber's profession; the dictaphone is, in a measure, doing away with time consumed in stenographic work. In fact, the commercial progress that we are seeing every day has its evil effects on some just as its beneficial effects on others; and we might say that it is certain in time, and perhaps at no great distant future, that the shingle roof will be considered a like menace to any other accepted hazard of a dangerous nature.

"The work being done by the various State organizations of Fire Prevention Societies is exerting every effort to educate the people along these lines, and it is astonishing indeed how little consideration is given to matters of this kind by people of great intellect and opportunity, and it seems that the only way that we can accomplish the entire retirement of wooden roofs is by year after year to be devastated by the great fire demon, spread by the wooden shingle roofs, just as typhoid and malaria has been spread by insects."

From the *Rochester Chamber of Commerce* we learn that: "There is at present an agitation before this organization in favor of such legislation (against the wood shingle roof). Our Fire Prevention Committee has formally gone on record in favor of barring the use of wooden shingles on roofs of new construction. When we have completed our work of gathering statis-

tics in favor of such an ordinance for presentation in a referendum vote to our membership, we will be pleased to forward them to you. In return we would appreciate your courtesy in keeping us posted on developments in the national campaign you are starting. We would like also to receive any information and data that will have a bearing on the agitation in Rochester."

John A. O'Keefe, Fire Prevention Commissioner of Massachusetts, says in part:

"In the metropolitan district of Boston, I have been especially interested in stamping out the use of wooden shingles. Our experience has been that ordinarily they are a common cause for fires, and that when conditions combine in some exceptional manner they are a menace to the city. Proofs of that may be found in the stories of the Salem and Chelsea fires.

"Last fall, under my suggestion, a committee representing the twenty-six cities and towns of the metropolitan fire prevention district of Massachusetts, after mature consideration of this matter, recommended that wooden shingles be not used for roof covers in the metropolitan district. The feeling was, at first, that a resistant shingle of some sort or other be used.

Since that time several cities and towns have adopted the recommendations; others, unfortunately, have not."

These cities and towns which have adopted ordinances restricting the use of wooden shingles are:

Brookline	Cambridge	Medford
Everett	Lynn	Newton
Melrose	Quincy	Revere
Somerville		Chelsea

The Mississippi Society for the Prevention of Fires expresses the following opinion: "Our Society is making a very strenuous fight towards having the shingle roof give way to those of non-combustible character. In fact, I might say that there is no section of the South where the shingle roof is more in preponderance than in Mississippi, and we believe that it is the cause of a great many fires, due to sparks on roof, and also conflagration feeders."

The office of the *Schedule Rating Expert for New Jersey* makes the following statement in a letter to CONSTRUCTION regarding the shingle roof hazard:

"We discourage the use of wood shingles for roofing



A typical asphalt shingle roof and brick exterior house. This roof provides safety from conflagration danger

dwellings at all times and recommend the use of an incombustible roof covering, in fact from time to time we recommend to the various municipalities in the State of New Jersey the adoption of an ordinance prohibiting combustible roof coverings."

The State Fire Marshal of Illinois says:

"All buildings having shingle roofs possess a particular menace, not only to adjacent buildings, but also to buildings of like construction in the immediate neighborhood. *This menace is the shingle roof.* Burning shingles are carried great distances by the wind or draft of the fire, and when they alight on other shingle roofs, create fearful havoc. Thus, the wooden shingle furnishes not only the fire brand, but the tinder which it ignites.

During the hot, dry months of summer and autumn, wooden shingles become like tinder and many fires are caused by sparks from flues and chimneys alighting on such roofs. During the year 1914 flying sparks caused 1,731 fires in the State of Illinois, and of this number 1,145 were caused by sparks alighting on shingle roofs. These fires caused a damage of \$643,841. This amount does not constitute the entire damage caused by the shingle-roof hazard, because it only includes the damage to those buildings in which the fires originated, and does not take into consideration the fact that a large part of the 944 fires reported as having been caused by exposure the original fire was due to sparks alighting on shingle roofs."

From M. B. Leach, Building Inspector of Houston, Texas, some very interesting information has been received. After stating that in his opinion the wood shingle, if used at all, should be limited to the outlying districts which are sparsely settled, Mr. Leach says that at present there is a strong prejudice in Houston toward the use of the wood shingle because in recent storms many fire resistive roofings failed to withstand wind-pressure, this fact being due to poor workmanship and improper application. Here it would seem advisable to discuss

The Effect of Wind and Snow

Many sections of the country, among which New England stands out prominently, are subject to terrific wind-storms at various times of the year. The question of wind-pressure on sloping surfaces is one which has never been as carefully analyzed and studied as would seem necessary. Various attempts have been made, by exposing surfaces to air-resistance on trains moving at regulated speeds, to determine the pound-per-foot pressure of winds. On a solid object of pyramidal shape, where the sides were twice the length of the base, it was found that the pressure equaled that of a horizontally held section the size of one side. At the same time, on a roughly surfaced sloping plane, such as a shingle roof, the wind has a strong lifting

effect and local conditions should be taken into consideration when roofing is applied. Wind-pressure would seem to vary from two to forty-five pounds to the square foot, depending on topographical conditions and the relative locations of other buildings. A safe figure would seem to be thirty pounds. A roof designed to withstand this pressure should be safe at all times. The general construction of roofs is usually sufficient to take care of snow-loads, but the chief danger, particularly in the use of slate, tile and similar roofing is the tendency of snow to lodge under the edges of the shingles, melt, and exert a lifting movement when ice forms which tends to force the shingle out of position and cause disintegration and leakage or, in the case of slate, sculping.

When the slope of a roof has over 12-inch rise per foot of horizontal run, a snow and accidental load of 8 pounds per square foot is ample allowance. When the slope is under 12-inch rise per foot of run, a snow and accidental load of 12 pounds per square foot should be provided for. The snow load acts vertically, and therefore should be added to the dead load in designing roof trusses. The snow load may be included when a high wind pressure has been considered, as a great wind storm would very likely remove all the snow from the roof. The following table gives the pressure exerted upon roofs of different slopes by a wind pressure of 40 pounds per square foot on a vertical plane, equivalent to a violent hurricane with a velocity of nearly one hundred miles per hour.

WIND PRESSURE ON ROOFS. (POUNDS PER SQUARE FOOT)			
Rise Inches Per Foot of Run	Angle with Horizontal	Pitch Proportion of Rise to Span	Wind Pressure Normal to Slope
4	18° 25'	1/6	16.8
6	26° 33'	1/4	23.7
8	33° 41'	1/3	29.1
12	45° 0'	1/2	36.1
16	53° 7'	2/3	38.7
18	56° 20'	3/4	39.3
24	63° 27'	1	40.0

Arguments for the Wood Shingle

The weakness of the defense of the practice of using wooden shingles is plainly evidenced at the various gatherings of the lumber interests.

A mass meeting of the shingle manufacturers of Washington, Oregon and British Columbia was held in the Commercial Club at Everett, Washington, on October 8th, last. Considerable time was taken in the discussion of the effect of the marketing of "substitute" roofings, the antagonism of insurance interests and the publicity that has been given to "exaggerated" statements of the fire hazard of wood shingle roofs.

By "substitute" roofings is meant the various types of fire-resistive roofings. This would seem to be the one exception to the general rule that substitution is synonymous with inferiority.

One of the speakers, W. C. Miles, of the Globe Lumber Company, made some very interesting comments on the wooden shingle as a fire menace. After

stating that the wooden shingle is not the fire menace it is "credited" with being, he proceeded, according to the rules of proper argumentation, to attempt proof of his point. Here is the proof. Since 1875 the annual fire loss per capita has been growing rapidly. About 1880 the first so-called fireproof building came into existence. Obviously the fireproof building has been a useless development. He stated emphatically that there is no such thing as a fireproof building, and that the fire loss has increased with the decreased use of wood shingle roofs. This is logic!

Logic, in its pure meaning, is the science of exact reasoning and permits us to say that "Nothing is better than heaven—an apple is better than nothing—an apple is better than heaven."

Through Mr. Miles' reasoning a new light is shed on the great problem of bringing about a reduction of the fire waste. We might try universal wood shingle roofing. The idea of the inverse ratio of the wooden shingle and the fire loss is original at least.

Further, Mr. Miles says that the insurance interests are the greatest enemies of the wooden shingle. Naturally—it has cost them more than any other single fire-hazard in existence, and it must be remembered that the public pays the loss.

As for the non-existence of a fireproof building, there is an element of truth in that statement. Until very recently there has been too much wood used in the form of doors, trim and window frames; but the day of "furnace" building construction has passed!

F. J. Martin, of the Northwestern Mutual Fire Insurance Company of Seattle, who, it was stated, "is with the lumber and shingle manufacturers," also commented on the situation. We touch the "high spots" in his address:

"I am not going to tell you that shingles are fireproof. I do not know of anything that is. * * * I know of no roofing that is as cheap, durable and beautiful as a wood shingle roof. * * * It is practical outside of conflagration districts. * * * While insurance men may talk against the wood shingle, the rates are what count, and there is so little increase in the insurance rate on shingled houses that it is scarcely worth considering. I do not think you need to fear anything but unjust legislation, which has been brought about in some States by agitation."

Unjust legislation? A natural statement, but somewhat biased; for it must be remembered that Mr. Martin "is with the lumber and shingle manufacturers." CONSTRUCTION, then, is with the manufacturers of fireproofing materials and devices because their product is a means toward that safety in building construction which is rapidly becoming a public demand. If wood could possibly be classed in this category it would gladly be done!

Mr. Martin plans to build a home for himself and to use shingles for the roof and sides. Credit be to

the man who has the courage of his convictions; but—convictions would not check the fire if it came his way or out of his own chimney.

The Cost Question

The most short-sighted policy pursued by the American people to-day is that which tends toward sacrificing safety to cheapness in building construction. This statement is directed particularly to the individual.

If John Jones wishes to build a house he goes to an architect and tells him what his idea of a house is and how much he wants to spend. In planning the details the intelligent architect of to-day, who has come to realize the value of warding off the danger of fire, will advise Jones to build his house of fireproof materials and to put on one of the many styles of fire-resisting roofing which are on the market. But Jones came from New England, or, for that matter, perhaps from New Mexico, where his father's home was roofed with wood shingles. Jones reads the newspapers, but he has become so accustomed to seeing several fire losses a day that he never stops to read the details and so has never had reason to realize the danger of the shingle roof. Like many Americans, Jones has the shingle roof habit, so he asks the architect how much less the actual cost of the roofing would be if he uses wood shingles in the place of those which are fire resistive. The answer is probably a few dollars—and the result is another wood shingle roof.

Now for the real difference in cost.

Jones expects to live in that house for a number of years. His insurance rate is higher and at the end of ten years he needs a new roof. Aside from the question of insurance and fire hazard, the wooden shingles which Jones' father used were better shingles than Jones can buy to-day. Shingles many years ago were split from the heart of straight-grained cypress or white pine butts, and made a roof covering which would last for forty years or more. It is almost impossible to obtain shingles of this kind now and the cost is naturally high. The shingles that Jones bought were made from sawn lumber—ready to curl, warp, twist or split under the action of the weather.

Good fire-resistive shingles will last twice as long as present-day wood shingles.

This is the ultimate cost without any consideration of Jones' criminal negligence in housing his family in a fire-trap, or the burden of additional conflagration hazard which he imposes on his community.

In the matter of cost let us consider how far the insurance saving will go toward eliminating apparent additional cost of good fire-resistive shingles.

The average penalty, or additional charge where wood shingles are used, has been shown to run from 5 to 25 cents on each \$100 of insurance.

Thus, at an average increase of 15 cents the total



Copper shingles

excess for a house valued at \$10,000 is \$15 a year, or, taking advantage of the customary five-year policy at four-year cost, \$60 additional insurance in five years. Then, too, there is an additional contents charge.

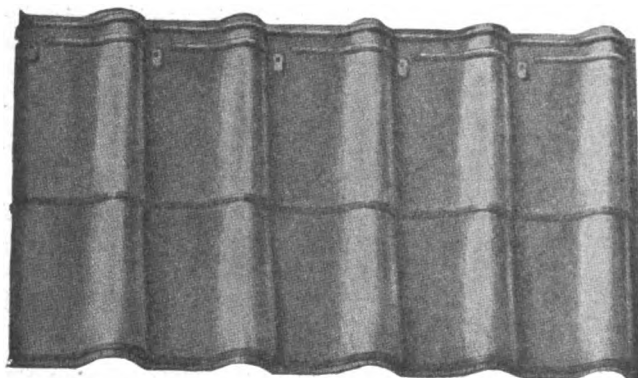
Thus the difference in insurance cost would soon pay for unburnable roofing.

Proper Roofing

The discussion of the dangers attending the use of wood shingles naturally leads to a careful consideration of the various types of roof coverings which have been primarily designed to overcome the fire hazard.

A former dominant factor in curtailing the general use of fire-resistive and retardent roofing—cost—has rapidly become a thing of the past owing to the placing on the market of many types of shingle roofing, some of which are absolutely unburnable and others which at least counteract the most serious roofing hazard, that of flying brands. A brief consideration of the various shingle types of roofing will be of direct interest to architect and property owner alike.

In the consideration of the costs of various types of proper roofing shingles, it must be remembered that a fair quality of wood shingle costs, on the average, \$5.50 a square (100 square feet of roofing). The various types of roofing which sell at prices higher than this will last twice as long and need far less repairing than the wood shingle roof, while at the same time they reduce insurance costs and remove the danger of fire from an outside source. The ultimate cost is al-



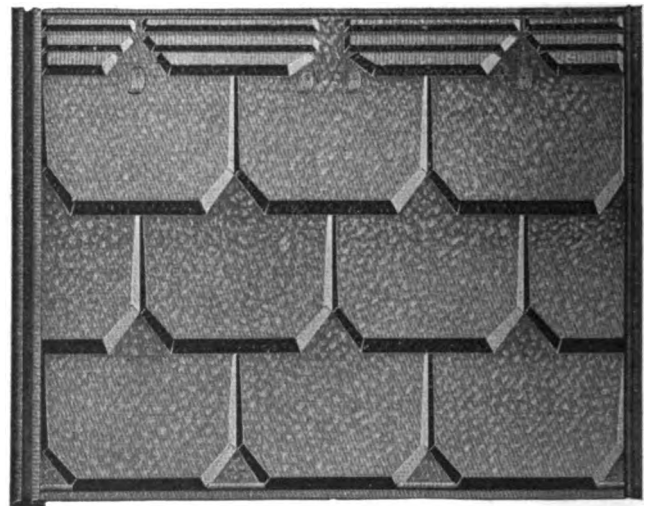
Steel shingles

ways the real cost. Nowhere does this better apply than to the purchase of roofing materials.

Metal Tile.—This roofing is of the shingle type, made in a variety of forms for the purpose of preventing leakage and to resist wind-pressure. The materials used are sheet copper, tin, galvanized iron, terne plates and other metals. Photographs herewith show different types of metal tile. Cost, \$6.50 to \$15 a square.

Weights run about as follows: terne plates, 110 pounds; galvanized steel, 125 pounds; copper, 140 pounds. This types of shingle can be obtained in graduated forms for use on circular roofs, domes, turrets, towers and other conical surfaces, and present an excellent appearance coupled with safety against the brand hazard. The cost is reasonable.

Clay Tile.—The use of clay tile, in various interlocking shapes, can be recommended if the tile be properly made and carefully laid. Such tile, unglazed and not hard burnt, is porous and liable to weather damage,



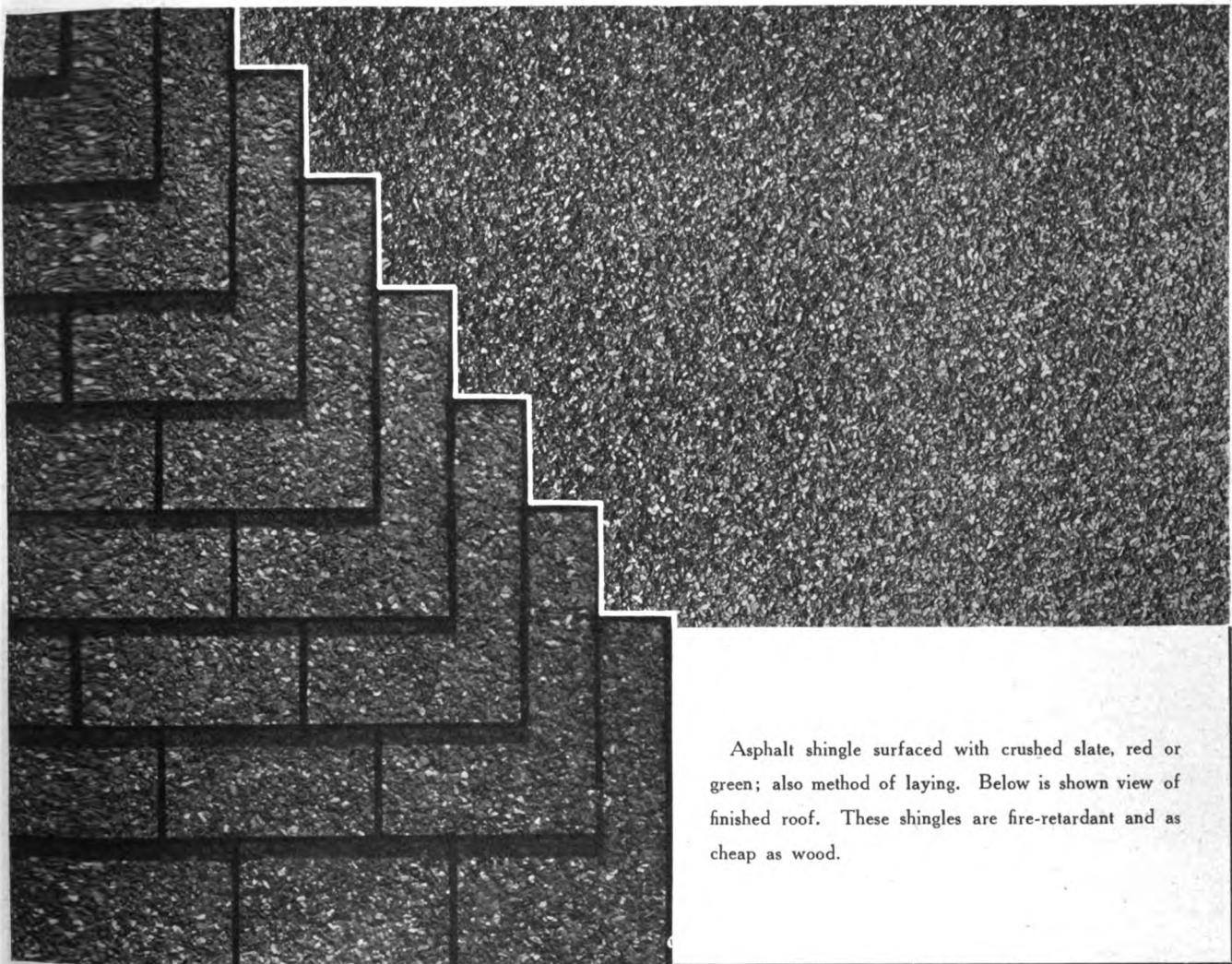
Steel shingles

which causes deterioration and leakage. The glazing must be exceedingly well done to avoid decomposition.

This is the heaviest of the roofing tiles, and care must be taken to design the rafters and supporting members with this end in view. A clay tile roof is handsome in appearance and absolutely fire-resistive. Its relative cost is high, but for some types of architecture, particularly where heavy granite or other rough block wall construction is used, the general effect is excellent.

Concrete Roofing.—Many dwellings in the Middle West are being roofed with concrete slabs. Various patented steel forms for reinforcing are laid on the roof supports and about 2½ inches of concrete laid. Over this is spread a layer of waterproofing. This is an excellent type of fire-retardant roofing.

Asbestos Shingles.—The asbestos shingle, as manufactured and widely used throughout the country, is composed of about 15 per cent asbestos and 85 per



Asphalt shingle surfaced with crushed slate, red or green; also method of laying. Below is shown view of finished roof. These shingles are fire-retardant and as cheap as wood.

cent Portland cement. This shingle is manufactured by the "building up" process, layer by layer, or by the method of moulding slabs and compressing them under hydraulic pressure. The resultant material is not unlike stone, and is fireproof, water and weather proof, presenting a pleasing appearance, being manufactured in various shapes and colors.

The weight of these shingles runs about 220 to 700 pounds to the square and the cost varies from \$7 to \$15. This type of shingle is absolutely fire-resistive and has an excellent effect in blanketing the flames.

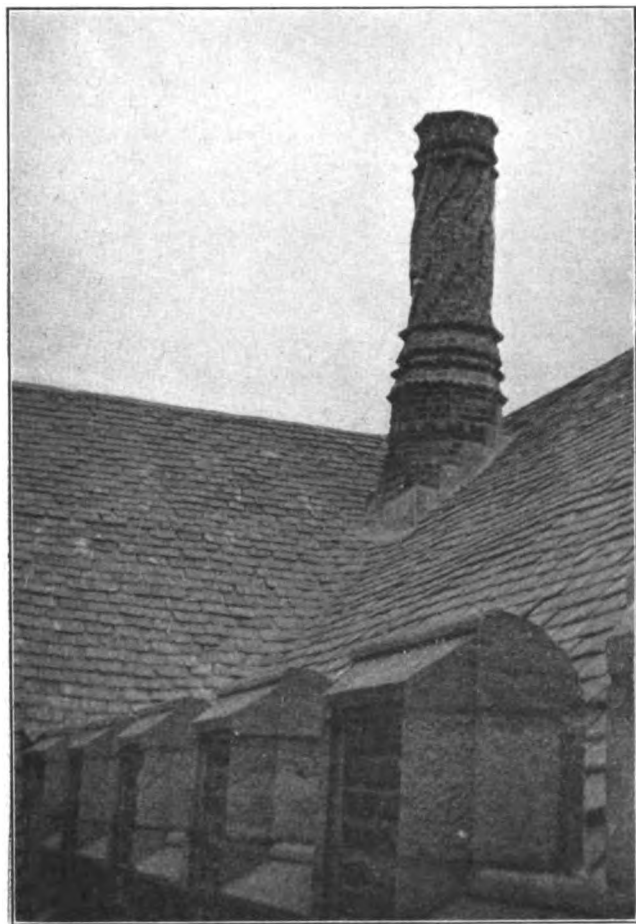
Asphalt Shingles.—Well made asphalt shingles form an excellent fire-retarding roof covering. This shingle is usually composed of a flexible body of fibrous felt which has been permeated with hot asphalt as a preservative and waterproofing medium. The wearing surface is faced with crushed slate or rock forced in under heavy pressure.

The cost of asphalt shingles runs from \$4.50 to \$6 per square and the average weight is 200 pounds to the square. The stone or slate surface of these shingles is practically proof against the flying brand hazard and their use in place of wood shingles does not mean

an increase in roofing cost. The color effect obtained from the use of crushed red and green slate is excellent. Ready roofing shipped in rolls and applied in strips is also made in a similar manner.

Slate roofing, properly applied, makes a long wearing and absolutely fire-resistive roof. Almost invar-





Slate reproduction of Old Tudor stone roofing. Stephen Duncan residence at Newport, R. I.

iably, investigation shows that the failures of slate roofing have been caused by poor workmanship and improper practice.

Slate, or clay tile, constitutes a heavy dead-load which must be taken into consideration in the designing of the supporting members. The ordinary commercial slate shingle runs about 750 pounds to the square, and the cost averages \$8.50, complete on the roof. This slate usually runs about three-sixteenths of an inch in thickness. For other thicknesses the costs can be computed by figuring a weight of 4,000 pounds per square per inch of thickness.

In the application of slate shingles, steel nails should never be used. To this practice alone many of the failures can be attributed. The slate should be drilled and countersunk, and nails with lead washers are most satisfactory. In the ordinary "punched slate" the countersunk surface is always rough and the nails almost invariably will be found to hold at one point only. Sharp-shouldered nails should never be used and bronze composition or copper nails should be used in the place of steel, which rusts and allows loosening.

In the matter of the protection of slate roofing against wind-pressure and driving snow a noteworthy example of proper roofing construction has just been

completed at Newport, R. I., on the beautiful residence of Stephen Duncan. Here slate of varying thickness and colors was used to give an almost exact reproduction of the old Tudor stone roofing so often seen in the picturesque sections of England. The accompanying photograph will give some idea of how the effect was brought out. The slate shingles were laid in weak lime-cement mortar for the purpose of obtaining strength and durability. The cost figures about \$17.50 per square.

Slate in its various forms has many possibilities for architectural beauty, owing to its wide range of colors and textures. Greens and grays have been most successfully used in Italian style for country homes.

The architect is cautioned in the selection of slate, where a certain degree of weathering is wanted, to be sure that the stock is already weathered or comes from the larger quarries where the rock is of known weathering index.

From the fireproofing standpoint, slate can be recommended if it is carefully applied; and it is clearly the duty of those interested in the manufacture and use of slate for roofing to do everything possible for the forwardance of the knowledge of the proper use of this material.

Fire-Retardant Wooden Shingles

There are several firms who are endeavoring to develop a material for the treatment of roof shingles that will not only make them really fire-retardant, but at the same time increase their life. Naturally, if a material of this kind can be produced that will have the approval of the Underwriters' Laboratories and the Board of Fire Underwriters it will be of great benefit to the building industry, and, as it seems more than probable that such a material will be out in the near future, such material should have the approval of the Underwriters' Laboratories or National Board of Fire Underwriters before any consideration is given to it, for otherwise the claims for some of the *so-called* fire-retardant material might be accepted as facts, with the result that property owners would pay for a fire-retardant roof without having any protection beyond what an ordinary wooden shingle would give.

The Lesson

Always the greatest reform comes after the most severe lesson.

The town of Chelsea, Mass., had a shingle-roof conflagration loss of \$10,000,000 in 1908, and having learned a lesson, prohibited the wood shingle roof.

Salem paid \$14,000,000 to learn that the wood shingle roof is a severe fire hazard.

The United States pays \$100,000,000 every year and *does not learn* the obvious lesson!

Every home that is roofed with wood shingles stands ready to pay its own full value, the value of its con-

tents, and perhaps the lives of some of those who are housed therein as part of the great ineffectual fund which is the ironical tribute exacted annually by fire as it travels the wood shingle route through America.

The attention of every right thinking citizen is called to the present agitation for the passage in every State in the Union of a law governing personal liability for a fire loss. This measure provides that if fire occurs in any building and spreads to other buildings, thereby causing damage, the owner of the premises in which the fire originates shall be held liable for such consequential damage.

This law will be a strong factor in the suppression of the use of wood shingles. No man, realizing if he has wood shingles on his house, and the house burns, these shingles will in all probability carry burning brands to nearby houses, thereby causing thousands of dollars in fire loss for which he will be responsible, will use wood shingles. This measure should be universally introduced and supported. It has already proven its value in European countries, where the average fire loss per capita is less than one-tenth that of the United States and Canada.

The Moral Responsibility of Municipal Officials

To you who accept a position in connection with the building department of any city, town or village, falls a great responsibility—that of safeguarding the property and lives of your fellow citizens against the dangers incident to the fire hazard. The average citizen, in the course of his daily labors, has neither the time

nor inclination to busy himself inquiring into and studying local building conditions and hazards. That is why he has created building departments and building inspectors! The citizen probably does not know that there are incombustible roofings, or that the shingle roof constitutes a great menace to his family and himself. It is not his business to keep abreast with proper practice in building construction. It is yours!

Those who have the authority to make laws and codes governing building construction, whose daily work it is to safeguard the community, must awaken to the great danger of the wood shingle roof and force it out of existence. You, Mr. Lawmaker and Mr. Building Department Official, are morally responsible if, through your inaction, a great calamity in the form of a conflagration visits your community. Do not wait until after the lesson is brought home to you. Educate your people to recognize this hazard and legislate against it! It is clearly your duty!

In conclusion, it is to be hoped that the right-thinking American citizen, whose tolerance of wood shingles and improper roofing practice can only be ascribed to lack of knowledge of the tangible and ever-present dangers of such conditions, will realize the necessity of action, and, so realizing, act promptly.

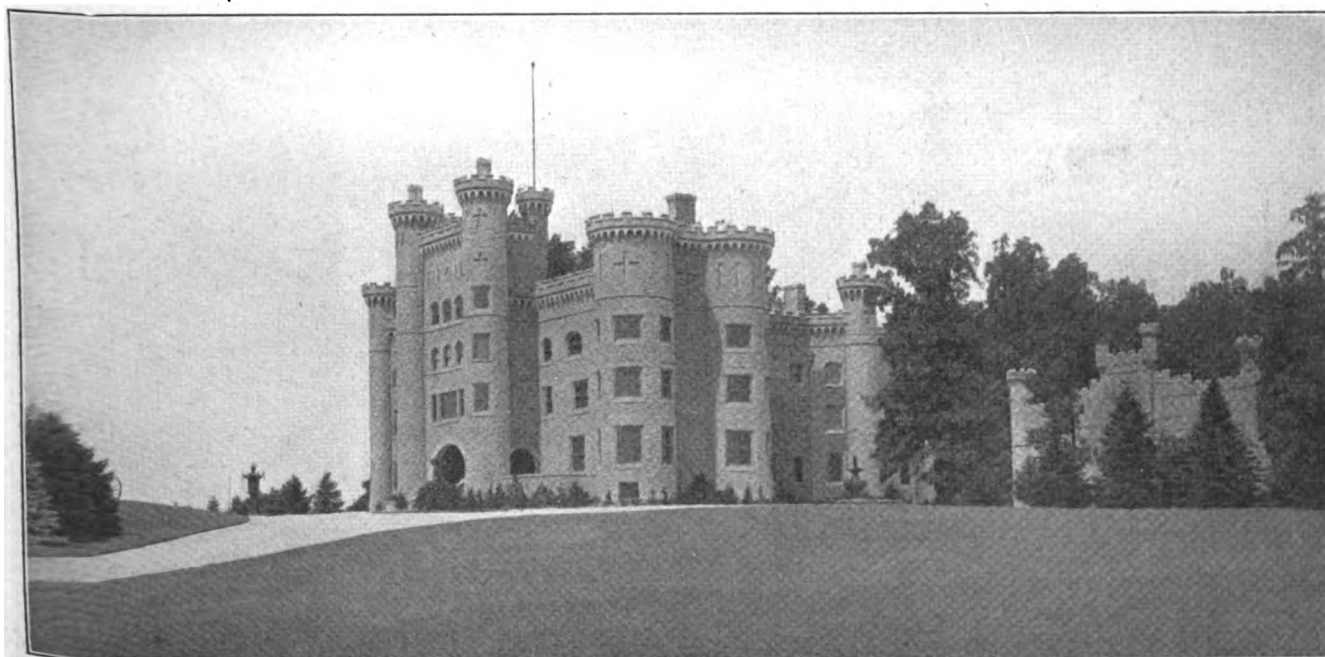
Encourage legislation in your city or town against the wood roof.

When you build—leave out wood.

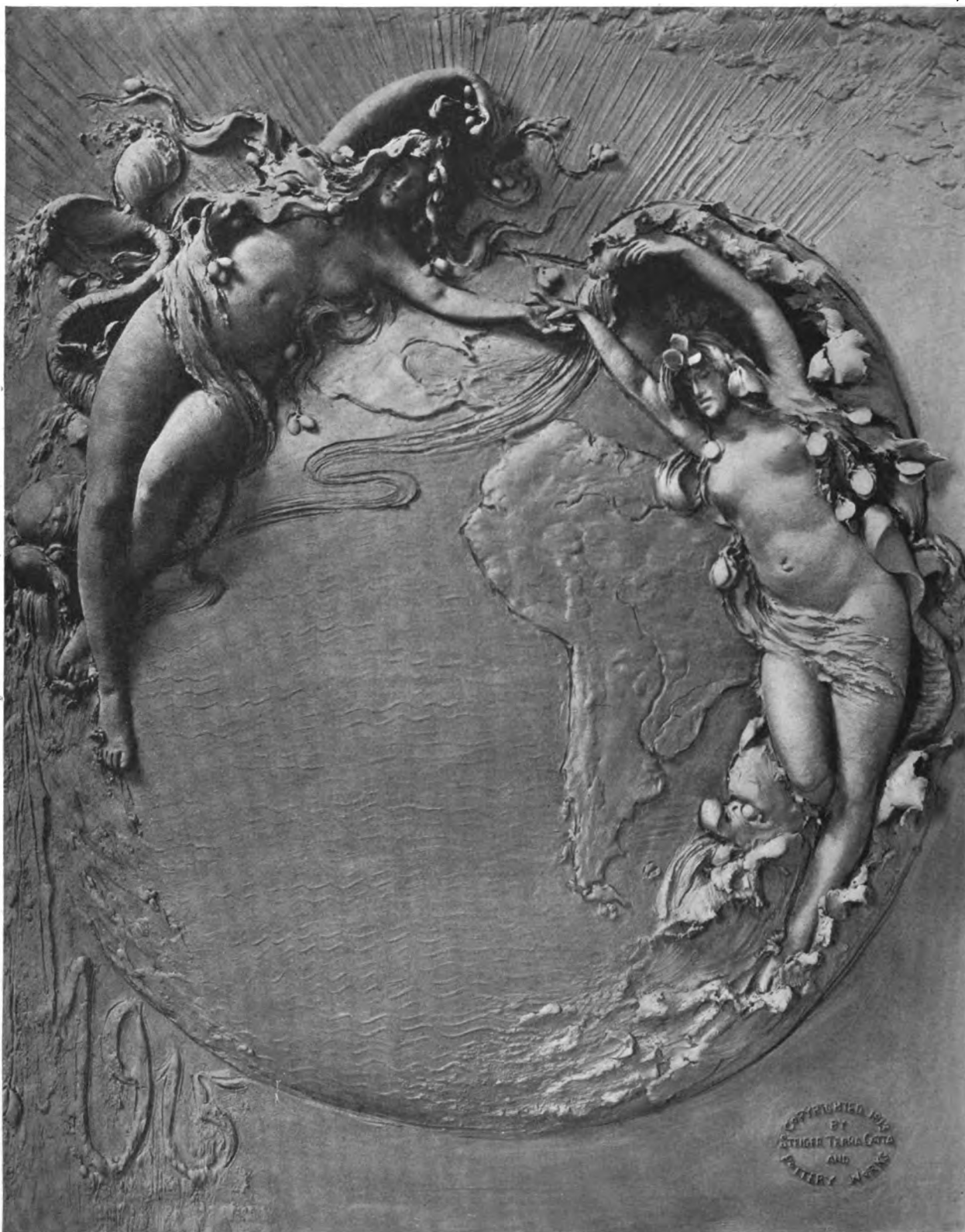
When your friend or neighbor builds, advise him against wood.

(Continued on page 109)

In the December Issue of CONSTRUCTION Will Appear an Exhaustive Article on "The Protection of Large Roof Areas"



Consistently fireproofed residence of Dr. R. V. Mattison, Ambler, Pa.



A Terra Cotta Panel of Grace and Beauty





The Adaptability of Architectural Terra Cotta



ONE of the strong factors in the combination of safety and beauty in building construction is the use of burned clay in its various forms. The practice of beautifying the exteriors of properly constructed fireproof buildings by the use of brick in various colors and patterns, and architectural terra cotta, with its great artistic possibilities, has become general. The purpose of this article is to bring to the attention of those interested in fine ornamentation, the simplicity and economy of designs worked out in terra cotta. In the following issue of CONSTRUCTION will appear the pictured story of brick in ornamental forms, as used in modern architecture.

Architectural terra cotta is worked into any form by making a plaster mold and pressing the piece in clay from the form. In this manner cornices, pediments and friezes can be duplicated many times from the mold, at relatively low manufacturing cost.

Terra cotta in this form offers stubborn resistance to both fire and water, being unburnable and impenetrable by moisture. It is practically unwearing, and will withstand the ravages of the elements in a most satisfactory manner.

Architectural terra cotta is further excellently adapted to modern building construction because it is at once strong and light. Ordinarily these two qualities are inconsistent: the material that is strong is heavy; that which is light is weak and its resistivity is usually uncertain.

The modern skyscraper demands a material that is so strong that it can be used with safety under the most exacting requirements, and so light that the cost of foundation, superstructure and installation may be consider-



ably reduced, without sacrificing beauty.

Architectural terra cotta not only imposes a light dead load, but because of its infinite possibilities as regards form, may be modeled to express the most delicate beauty and charm. Limitless color combinations and surface finishes may be employed, and permanent discoloration by soot and dirt need not be feared, as the material may be washed clean at any time with ordinary soap and water.

The practical advantages of the use of a material having such excellent qualifications are plainly understood. Because of its lightness in weight it is easily and inexpensively handled and put in place. Once properly placed in position it is durable for all time. It cannot melt, disintegrate or decay, and will not chip off.

BEAUTIFYING SCHOOL BUILDINGS

In the designing of schoolhouses, architectural terra cotta has played an important part.

Fletcher B. Dressler, author of "American Schoolhouses," says:

"The problem, then, of building a schoolhouse to-day is in no small sense complicated by the growing tendency to use schoolhouses for worthy social work of all kinds. The tendency operates to bring school work into more vital touch with the real life of the world, and *vice versa*, it is bringing the American community into more vital relation with the teachers and those who are responsible for schools and school organization. Schoolhouses, especially in the large cities, have come to be used night and day, summer and winter; vacation schools have been established, in which unusual programs of work and play have been introduced. For their successful con-



summation, such programs often demand equipment and accommodations not needed in the regular day schools. In planning even a country schoolhouse or a high school building, one must, therefore, think not only of the present requirements, but also of the possible future needs of the community and enlarge his theories of the scope and purpose of public school education.

"And just here I desire to express the wish that some day in the near future more pains will be taken to make school-houses beautiful in external appearance as well as commodious and healthful within. Thus far the architects who have designed the large majority of our smaller buildings have clung tenaciously to the school-house type, and have given us, in the main, buildings devoid of any attempt at niceties of proportion or unity of design. The disadvantages of the effects to be obtained by the proper use of building materials have been lost sight of and in many cases attempts at cheap ornamentation have been made at the expense of real beauty of form and hygienic considerations."

The subject of architectural beauty in the construction of great office buildings is coming rapidly to the fore, and here brick and architectural terra cotta play an important part. In the latest wonder of the century, the Equitable Building, in New York city, which in itself constitutes an entire city, these materials have been combined to form an exterior design striking in its strength and simplicity. Only by the use of materials which allow the harmonious

blending of soft colors can this effect be obtained.

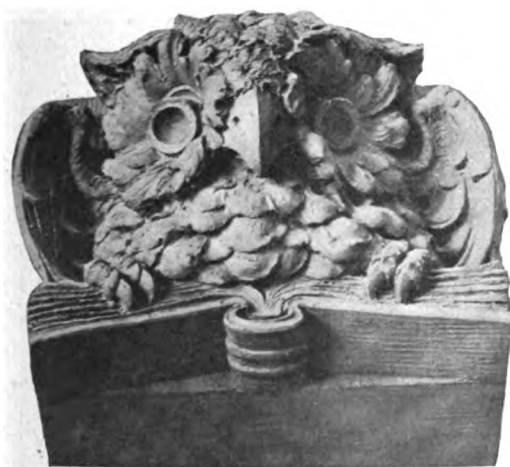
For the artistic ornamentation of theatres, both within and without, designs in terra cotta are unsurpassed. The movies, in particular, have become a part of the life of the American public, and undoubtedly exert an influence which must be directed for the general betterment, not only in the class of entertainment, which should be of an encouraging and uplifting

nature; but for the improvement of the mind by surroundings which are in themselves factors in the forwardance of good taste and refinement.

Callaesthetics, applied to the construction of factory buildings, would have raised a storm of ridicule from practical but narrow-minded thinkers, in the years gone by; but to-day many of our great cities have grown outward to include the manufacturing districts, and the word "manufacturing" is synonymous for industry carried on amid dirt, disorder, and ugly structures which form an



eyesore in the town or city where they are located. Now, however, the new era of practical conservation has brought up the question "Why should beauty be classed entirely as a luxury?" Most of us work through many hours of every day in office buildings or factories. We have all seen, and experienced, the uplifting thrill of the smallest indication of beauty—a flower on a grimy window-sill in a great factory, perhaps. How many eyes stray toward it? How much cheer does it add to the day's work? There exists a new tendency toward the realization that the improvement of working conditions will improve the quality



of work produced. Efforts are being made by great manufacturing interests to improve the home-surroundings of the workmen. Let the owner and architect alike realize that in the designing of factories and commercial buildings such buildings must be the second home of those who toil daily in them. Give the toilers light, air, sanitary conditions and simple beauty of surroundings! They will repay the added cost many times over.

Satisfaction of the æsthetic sense means full satisfaction. The age of ugliness in the construction of buildings, even for the most utilitarian purposes, is past. Architectural terra cotta combines usefulness and safety with beauty and economy in construction.

Every architect to-day must be alive to the growing demand for beauty and attractiveness in building construction. America, emerging from the rawness incident to the development of a new country, is pausing in the great race of the nations; and already a new note is sounding in the diapason of industry and ambition, the note of culture and refined taste. Every great nation, at the first breathing space in its primary struggle for existence, developed along æsthetic lines. Egypt, Greece, Rome, France—in all, the art of the sculptor, expressed in many beautiful forms, became predominant and raised the tone of national existence. That the Golden Age is dawning in the United States to-day is witnessed by the ever-increasing beauty of building exteriors to answer public demand.

Interesting indeed is the development of terra cotta through the changing art of the centuries. H. B. Lucas,



secretary of the National Terra Cotta Society, says:

"In the vast long ago, while the earth was yet a molten mass, preparation for the manufacture of terra cotta was begun by Nature herself, in the formation of igneous rock. Unnumbered centuries of crumbling under the action of air, water and sulphur fumes reduced crags and ledges of granite to powder, resulting in the production of clay, a peculiar soil, barren and unbeautiful, but destined to be one of the two earliest elements in the civilization of man.

"Man's most important discoveries were how to work clay and how to build a fire; and clay working would seem to have been the earlier of the two discoveries, inasmuch as his first rude possessions were sunbaked earthenware vessels. The addition

of fire effected a partnership of earth and energy which brought forth a material well-nigh indestructible.

"Of all the relics of antiquity which time has grudgingly spared us, only those of burned earth survive in the first freshness of their beauty. Through fire and frost, and centuries of burial in the depths of the earth, the little blue scarabs of the Egyptians and the bright, glazed tiles of the Persians, Babylonians and Chaldeans, come to light as firm, as new and as bright as when first taken from the kilns of the ancients. Likewise the urns, cornices, roof tiles, cresting, etc., of the Greeks remain to this day in a good state of preservation. In no other line of endeavor has man so nearly outwitted time and the elements.

"In clay, man found a



medium yielding to his every touch and reflecting his best ideals of beauty. From the days of the palace of Artaxerxes to the aspiring presence of proud skyscrapers, all the genius and ingenuity of man has failed to produce a more beautiful and enduring building material than properly burned terra cotta.

"Through the dark ages the claims of clay were in a measure ignored for those of stone. While Italy has fine examples in the work of the Della Robbias and other Renaissance artisans, and Spain in the palaces of the exiled Moors, and while in northern Ger-

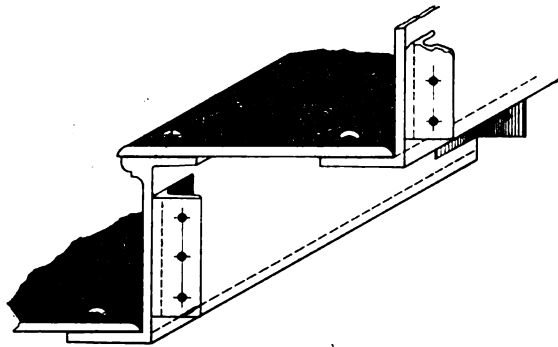
(Continued on page 96)

Safe Stair Construction

By H. W. Mowery

Member, American Museum of Safety

Construction of fire-safe buildings is demanded to conserve property and life, but there are details of construction frequently overlooked which cause great loss of life and serious injuries. In New York City last year there were 65 persons killed by fires in Manhattan alone, surface cars killed 53 and subway cars 12. From this it is apparent that the fire hazard is indeed



Approved metal step construction, with reversible anti-slip tread

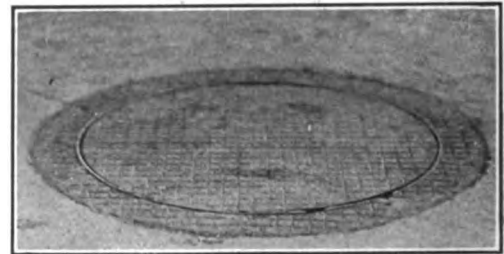
dangerous. But in the same section and during the same period there were 68 people killed by falls on sidewalks and 102 killed by falls on stairs, over half of which were caused directly by slipping. On a certain rapid transit railroad operating from New York there were 138 persons injured by accidents other than train accidents. Of these 138 casualties there were 11 workmen, principally in shops, and 127 passengers. Of these latter, 50 were injured on stairs. More than 39 per cent of the total number of passengers injured in other than train accidents were injured on stairs. This is most impressive evidence of the extreme seriousness of the stair hazard.

Since stair construction is a very small detail in the

erection of a building, it will be a small matter to eliminate many stair accidents, if it can be done by the use of proper design or materials. The experience of safety experts and others who have made a study of this question clearly shows that stair accidents result from several causes, namely:

- 1st.—Carelessness or haste of an individual.
- 2d.—Insufficient or improper lighting of the stairway.
- 3d.—Insufficient hand rails.
- 4th.—Incorrect proportioning of tread and riser dimensions.
- 5th.—Unsafe treads.

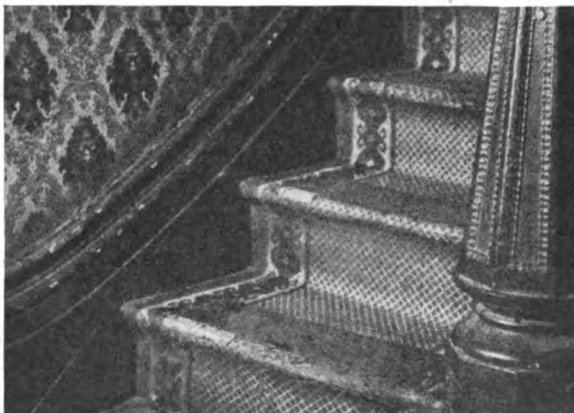
Those accidents where carelessness or haste on the part of an individual are responsible cannot be overcome by any universally applicable structural details. The education of the general public through the "Safety First" movement has unquestionably resulted in people being more careful, and, as this work has now been organized on a national basis through the American Museum of Safety and the National Safety



Approved anti-slip sidewalk coal hole cover

Council and laws in at least twenty-six States, a rapid improvement along this line is noticeable.

Insufficient or improper lighting on stairs may be



Hazardous condition of stairs frequently found



Approved method of repairing steps with anti-slip treads

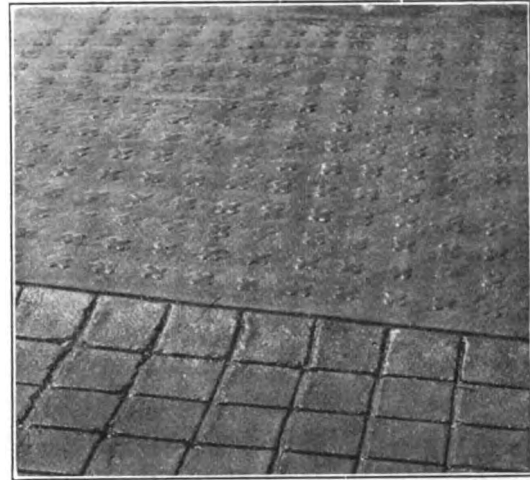
corrected without much trouble in existing buildings, and may be guarded against through proper provision for new buildings.

Incorrect proportioning of tread and riser dimensions is very common and causes many accidents. People are in the habit of taking steps of uniform length and, if stairs are not built to accommodate the average step, a person descending a stair after four or five steps will be either overstepping the edge or not stepping far enough to clear the edge, unless an effort is made to correct the stride.

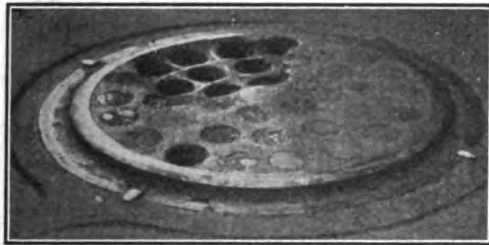
The United States Steel Corporation, the American Museum of Safety and the Universal Safety Standards prepared by the Workmen's Compensation Service Bureau uniformly recommend that—"The sum of tread and riser width exclusive of the nosing overhang of the tread shall be about $17\frac{1}{2}$ inches. The nosing overhang should be from $\frac{7}{8}$ inch to $1\frac{1}{4}$ inches, and is necessary to prevent accidents occurring by a woman's skirt catching between the back of her heel and the riser when descending a stair.

Unsafe treads are unquestionably the most prolific source of stair accidents. The Pennsylvania Railroad on one stairway in their Broad Street Terminal at Philadelphia had twenty-one (21) accidents in six

weeks with a certain type of tread. When that type was removed and replaced by another having an anti-slip element in the entire surface and extending down over the nosing edge and without any grooves parallel



Anti-slip inserts in sidewalk incline

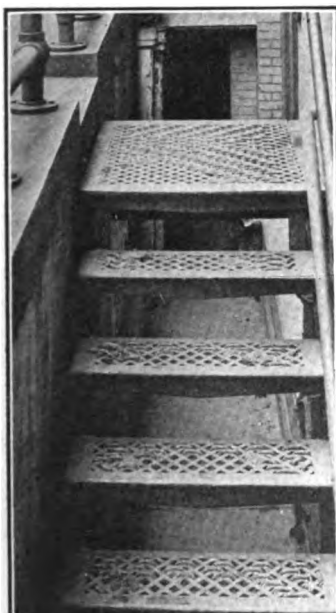


Hazardous sidewalk coal hole cover

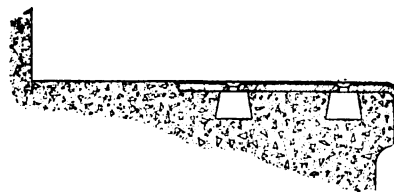
to the edge of the step, there was not a single accident reported in the following three months.

It has been noticed that a person descending a stair carries the weight of his body with the ball of the foot resting on the edge of the step. If that edge is of smooth metal or other slippery material, accidents are frequent. If, in addition to a slippery edge, there are a series of grooves parallel to that edge, the condition is worse, for when the inevitable slip occurs the foot slides forward, the front edge of the heel catches in one of the grooves and the person is pitched headlong, usually receiving a concussion of the brain.

Moreover, a series of grooves all extending in the same direction as the edge of the step is confusing because it is impossible with impaired vision or in poor light to clearly distinguish which one of these lines is the line of the edge of the step. Ordinary cast iron



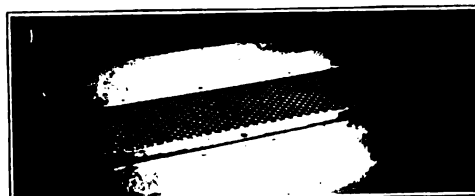
Slippery cast iron treads with rope woven through perforations



Detail of approved concrete step construction



Detail showing construction of approved method of repair



Usual old form of slippery steel and cast iron fire door saddle



Approved anti-slip fire door saddle

and checkered steel in various forms are being employed extensively for stair treads where low cost of construction is essential. This is, indeed, a short-sighted policy, because one accident on such a stairway may cost the property owner many times the expense of installing a *safe* and *anti-slip* tread. Several forms of anti-slip treads, some of which are erroneously called safety treads, are obtainable. The Underwriters' Laboratories, Inc., of Chicago, have investigated this question and have approved certain types of anti-slip treads, which are made under their direct inspection. This approval carries with it preferential rates in casualty liability insurance.

One excellent type of tread is a hard metal with alundum (the electric furnace emery) embedded throughout the surface in such manner that a material of extreme durability with an effective anti-slip surface under all conditions is obtainable. It is fire-safe and available in many forms for stair construction and also as floor and sidewalk inserts instead of the more ordinarily used cast iron and steel.

Architects and engineers certainly are responsible to a considerable extent for the nature of materials used in new construction. They should go into this matter

thoroughly and do their part by specifying an effective and approved form of anti-slip tread so that the needless accidents may be avoided.

TABLE OF APPROVED TREAD AND RISER PROPORTIONS

Angle With Horizontal	Riser-Inches	Tread Inches
30.35°	6½	11
32.08	6¾	10¾
33.41	7	10½
35.16	7¼	10¼
36.52	7½	10
38.29	7¾	9¾
40.06	8	9½
41.44	8¼	9¼
43.22	8½	9
45.00	8¾	8¾

(Preferred dimensions are in heavy face type.)

HAND RAILS

All stairs should be equipped with permanent and substantial hand rails thirty-six (36) inches in height from the center of tread, on all open sides; on at least one side of enclosed stairway four (4) feet or less in width; and on both sides and intermediate not over four (4) feet apart on all stairs six (6) feet or more in width. The adoption of this provision will aid people in saving themselves in case serious injury may be threatened through other causes.

In the December issue of CONSTRUCTION, Wm. Wallace Ewing, continuing his series on The Development and Fireproofing of Structural Metal, will describe present practice in the fireproofing of metal columns, beams and girders.

The Adaptability of Ornamental Terra Cotta

(Continued from page 93)

many terra cotta trimmings were used in various brick churches and public buildings, the majority of numerous building operations were carried on with other materials. In this country terra cotta was practically unknown fifty years ago, but the development of this material, through American enterprise, has been nothing short of marvelous. With the introduction of steel construction and the demand for absolutely fireproof buildings, it has come into such wide use that our modern metropolises might almost be called cities of terra cotta."

Clay in the form of terra cotta and brick has, indeed, been a wonderful factor in the production of natural wealth. When the raw products of the earth are combined with energy and the labor and skill of

man and transported to various locations, there to be erected in the various forms of building construction, real wealth has been produced. When these products, which are in themselves unburnable, are combined with burnable materials in the construction of these buildings, real wealth is endangered by the presence of the inflammable matter; when buildings so constructed burn, real wealth is destroyed and gone forever. Use the mineral products of the earth—they are beautiful and indestructible, they are refined and moulded into every form to produce every structural part of a building. To combine them with inflammable materials which provide paths along which fire may travel is more than foolish—it is criminal; and such practice must be discouraged.

Reinforced Concrete in Firesafe Construction

THE use of reinforced concrete, particularly in the construction of factories where heavy floor loads must be provided for, is coming into general favor, due to the excellent fire-resistive and structural qualities of this material and its comparatively low ultimate cost.

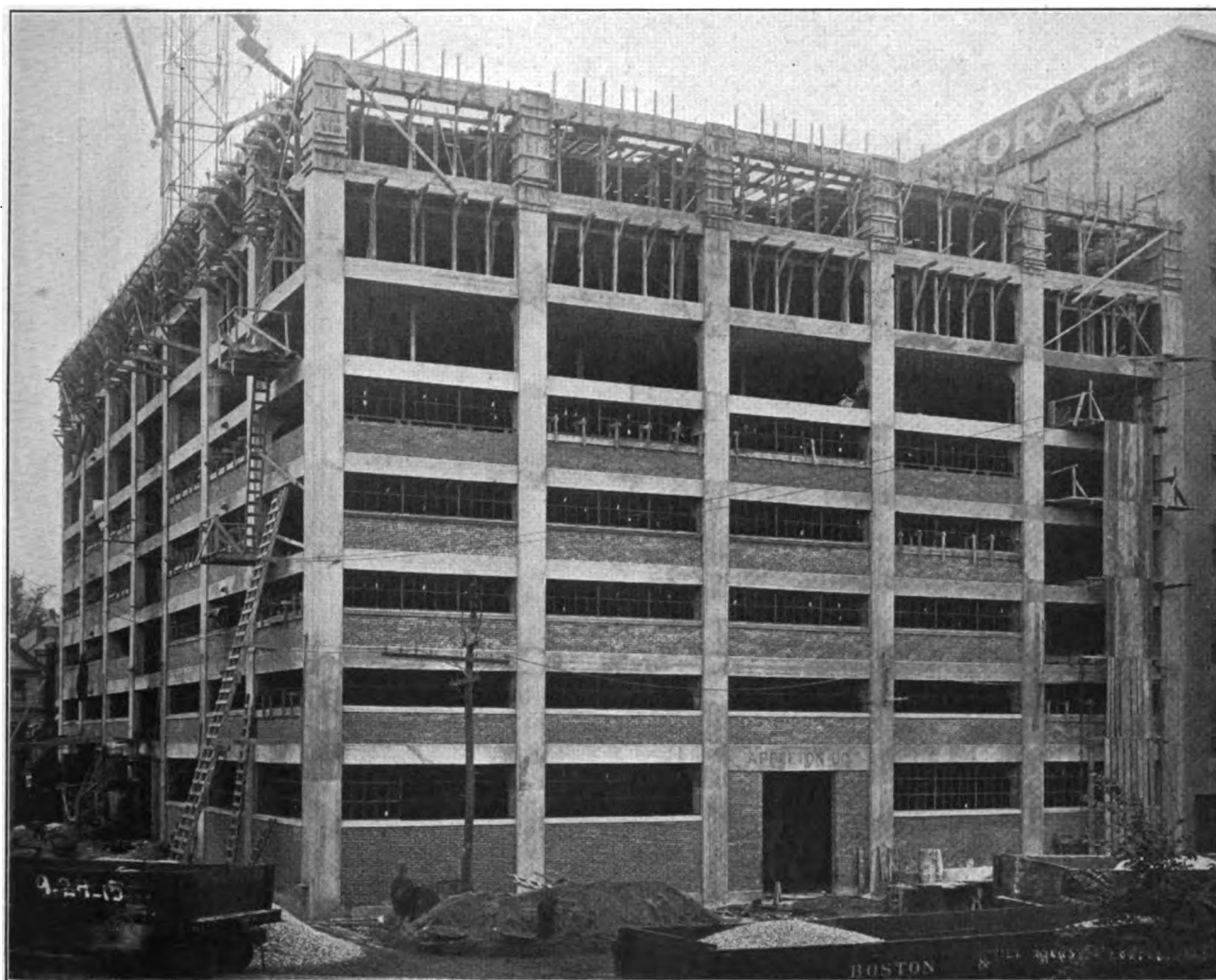
Reinforced concrete factories finished complete, with the exception of machinery, cost approximately from ten to twelve cents per cubic foot of total volume, measured from footings to roof, provided that the building is of simple, symmetrical design.

Great care must be exercised in the design of this type of structure, and it is most advisable to choose an experienced builder well equipped with the peculiar

knowledge required for reinforced concrete work, otherwise the liability of accident and failure during erection is greatly increased.

Reinforced concrete construction properly designed is excellently adapted to any weight of loading and to high speed and heavy machinery. It must be remembered, however, that cinder concrete, while a most excellent fireproofing material, is not as strong as stone or gravel concrete and will not stand up as well under the effect of the constant vibration of heavy running machinery, such as printing presses.

Many of the losses suffered through the failure of concrete are due to carelessness and improper design. *Concrete-Cement Age* in a recent issue outlined the



REINFORCED CONCRETE WITH BRICK PANELS

Storage building for the Appleton Company at Lowell, Mass. This view is taken two months after the start of the work. Built by New England Concrete Construction Company, Boston



THE TALLEST REINFORCED CONCRETE BUILDING IN THE WORLD

One of a group of seven buildings for the Robert Gair Company in Brooklyn. In the main part this structure is twelve stories in height, dimensions of buildings 200 by 103 and the tower (50 by 50) four stories, making a total height of sixteen stories, 275 feet from curb to roof. Built by Turner Construction Company, New York City

common causes of failure due to carelessness in construction as follows:

(1) Use of green and unseasoned cement as well as poor cement. A branded American cement is usually reliable, but it must not be too quick setting or lumpy or caked.

(2) Unsuitable aggregates, i. e., inferior grades of sand and stone. It is particularly necessary to avoid using any aggregate that may be handy. The best for the purpose should be chosen. It is also unwise to accept aggregates on the basis of small samples.

(3) An insufficiently graded aggregate, particularly one containing only very coarse material, or one with too much sand or loam. Natural aggregates are risky on account of the variations in the proportion of sand they contain, and should be screened before use.

(4) Dirty aggregate or water containing earthy matter, clay, loam, or strongly colored water.

(5) Carelessness in proportioning mixtures.

(6) Badly mixed concrete, i. e., incomplete incorporation of the aggregate with the cement.

(7) Too much water during mixing, or water carelessly applied, or an insufficient quantity of water to permit the concrete to attain its full strength.

(8) Allowing the concrete to stand until the setting action has commenced and then re-gauging before use, or using up old concrete.

(9) Setting concrete work on dry foundations and without thoroughly saturating the surface with water.

(10) Excessive ramming or tamping.

(11) Placing concrete in the winter months and allowing the material to become frozen before the cement has attained its final set.

(12) Excessive use of calcium chloride for lowering the freezing point.

(13) Placing concrete in very hot weather when

the temperature of the water is around 90° F. to 100° F., the cement at the same time being improperly seasoned, with the result that the cement gets an initial set in the mixer and is thereby broken when placed in the work.

(14) Excessive troweling or floating of cement surfaces.

This analysis will show that a great number of the failures are due to mechanical incompetency.

From the past history of concrete there is good reason to believe that if Portland cement is properly manufactured, the proper kind of aggregates used, and the work properly done, structures built of concrete will be reasonably permanent.

Concrete is one of the best and most reliable of building materials when mixed and put in place in a proper manner; where there have been failures in reinforced concrete buildings—or other reinforced structures, for that matter—it has generally been due to one or more of the following causes:

1. Premature removal of forms. Too early removal of forms has been the cause of most of the deplorable accidents in reinforced concrete construction.
2. Insufficient or badly arranged forms.

3. Erroneous design, i. e., errors in calculation or insufficient and poor reinforcement.

4. Mistakes in the construction of columns.

5. Unsuitable aggregate or cement.

6. Poor mixing.

7. Bad workmanship or inefficient supervision.

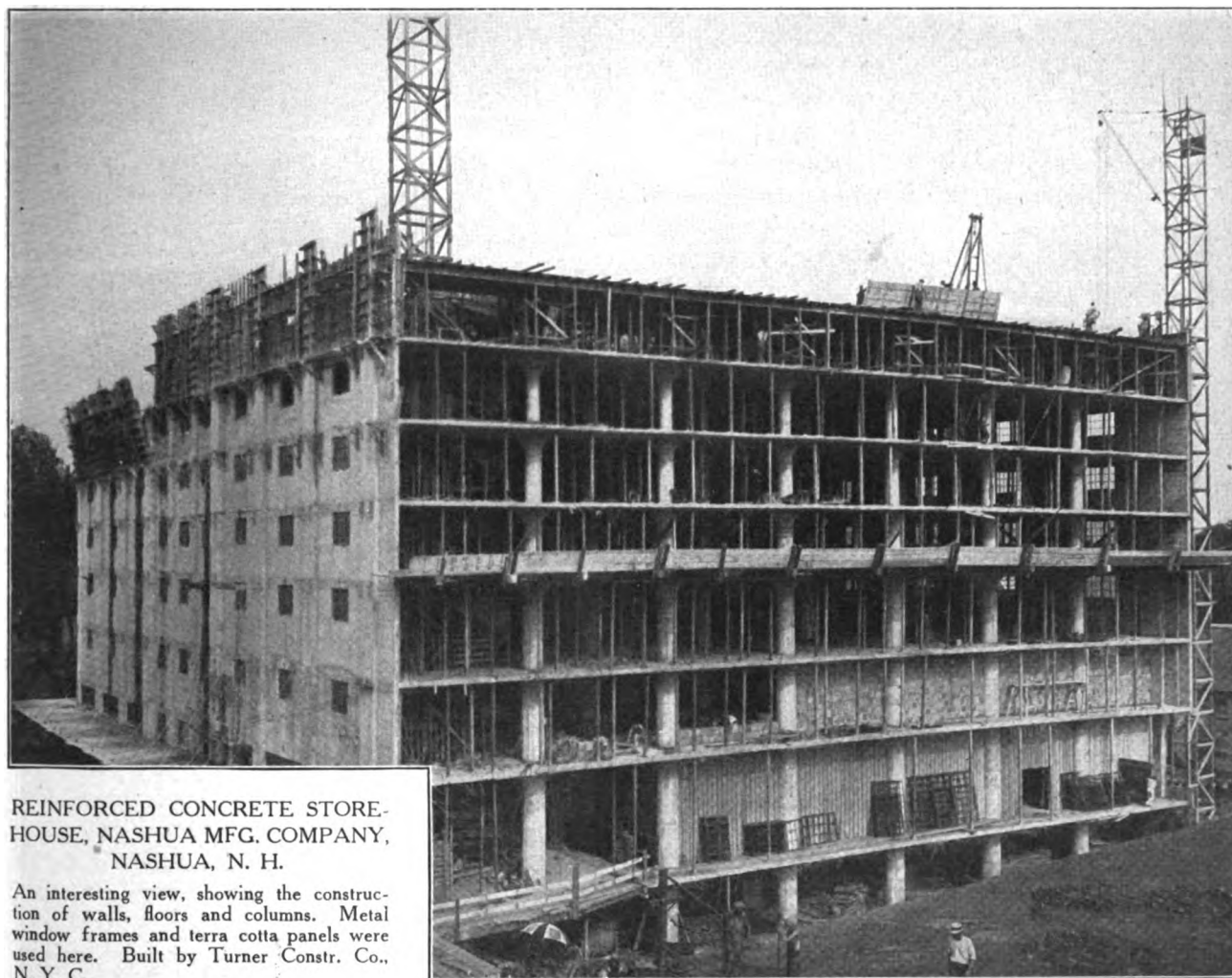
8. Misplacing or omitting the reinforcement.

Any of the above causes or any of those stated for plain concrete failures may be responsible for a reinforced concrete structure being a failure, but there is absolutely no reason, if these matters are carefully attended to, why every structure should not be a complete success.

Fire-Resisting Properties

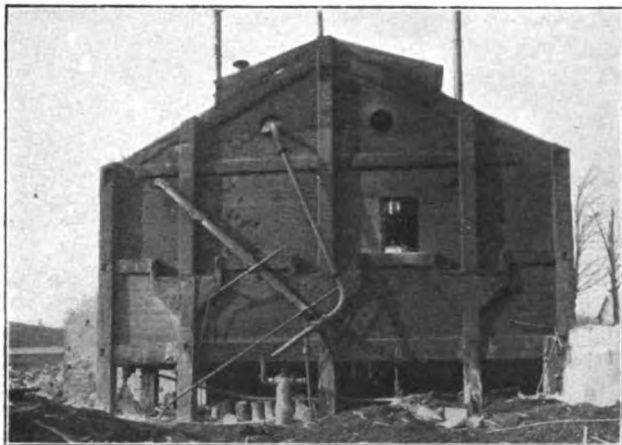
It would seem natural that as reinforced concrete is a hydrated compound, fire, driving off the water of hydration, would cause disintegration and failure. This tendency is overcome by the poor heat conductivity of concrete and the high temperature necessary to effect driving off the water. The fire-resistive qualities will be exhaustively treated in an article in next month's issue under the heading of "The Proper Fireproofing of Structural Metal."

—(W. W. Ewing)



REINFORCED CONCRETE STOREHOUSE, NASHUA MFG. COMPANY, NASHUA, N. H.

An interesting view, showing the construction of walls, floors and columns. Metal window frames and terra cotta panels were used here. Built by Turner Constr. Co., N. Y. C.



THE "WAX-HOUSE" IN THE EDISON FIRE

Tons of wax were stored in this structure when the fire took place. The burning contents created intense heat. The building survived as shown

The distinction of being the designer and builder of the first two reinforced concrete factory buildings in the world undoubtedly belongs to Ernest L. Ransome, of the Ransome & Smith Company, of Chicago. Of these the Pacific Coast Borax Refinery at Bayonne, N. J., deserves special attention not only as one of the earliest examples of this type, but for its notable record in passing through a terrific fire without serious injury.

In the spring of 1902, about four years after the completion of the building, it was subjected to a very severe fire test. Although the building itself was built of reinforced concrete it contained a large amount of wood in the shape of partitions, window frames and bins, wooden casks and a roof of wood. The heat of this fire was sufficiently intense to melt the brass in the dynamos and cause fusing of cast iron, which melts at 2,200 degrees Fahrenheit. The chief structural damage to the building was caused by the



REINFORCED CONCRETE IN THE EDISON FIRE

Though gutted by a fire in which terrific heat was generated, these buildings stood the test excellently

fall of a heavy tank which was located on the wooden roof and supported by timbers.

This structure was completely gutted, nothing being left but the concrete, masses of charred wood, and melted and distorted machinery. In several places throughout the building the concrete was split off and cracked, but the entire cost of repair of this material was about \$1,000. Had the building been consistently constructed, as present practice demands, with steel sash, wire glass and automatic fire doors, and sprinkled throughout, this fire would have been avoided. A most interesting feature of this fire was the total destruction of an adjoining steel tank-house. This was built of unprotected steel columns and roof girders and was reduced by the heat to a distorted and crumpled mass of twisted steel.

The expense of insurance on contents of a building built with reinforced concrete varies with the character of the building, but is, of course, greatly lowered by the installation of automatic sprinklers. Following



HOTEL TRAYMORE, ATLANTIC CITY, N. J.

Thirteen stories, reinforced concrete, with curtain wall of hollow tile and brick facing

is a tabulation of the average cost of insurance on buildings of this type and contents where sprinkler system is installed:

Agricultural implement factories.....	\$0.06
Automobile factories	0.045
Bakeries (of superior construction).....	0.07
Clothing factories (of superior construction).....	0.06
Lithographing and printing.....	0.055
Machine shops	0.04
Metal working plants (without sprinklers).....	0.06
Rubber factories	0.055
Shoe factories	0.05
Textile mills	0.05
Tobacco factories	0.06
Woodworking plants	0.07

With low insurance rates, and less valuation, concrete construction offers considerable insurance saving.

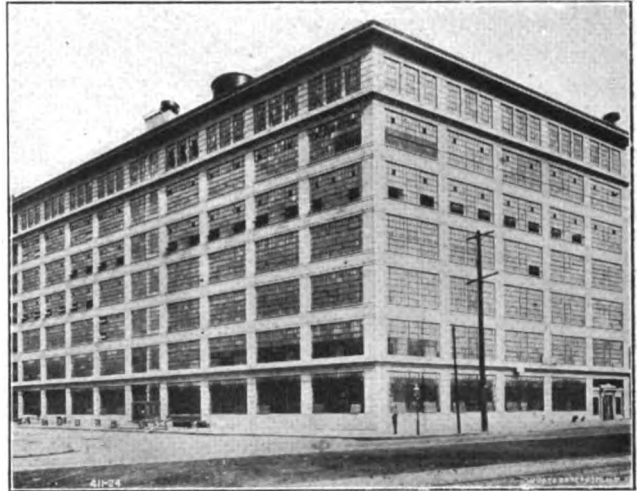
The interest aroused among the building fraternity as to the behavior of reinforced concrete in the great fire at the plant of Thomas A. Edison at West Orange, N. J., late last year led to the appointment by the American Concrete Institute of an investigation committee of leading building experts. An extract of the findings of this committee is given herewith:

The fact that at five different places several of the wall columns were rendered useless and yet the upper

portions of the building stood intact, is evidence of the superior merits of concrete in monolithic construction.

The highest temperatures in the concrete buildings were reached in the west end, on the third floor of Building No. 24, where was stored a very large quantity of highly combustible material. In this building wherever a wood-top floor was used it was in all cases entirely consumed, together with the wood sleepers embedded in cinder concrete.

The fused metal found in different parts of reinforced concrete buildings would seem to indicate that the fire reached an intensity of 1,000 degrees Fahrenheit in all these buildings, and in many cases as high as 2,000 degrees Fahrenheit. In the third story of Building No. 24, the second and third stories of



A TYPICAL CONCRETE FACTORY BUILDING

Built for A. Schrader's Son, Inc., Brooklyn, N. Y. Seven stories, 225 by 100 feet. The large window area insures light working conditions



MAIN OFFICE OF HOOD MILK PLANT

Pleasing interior of a reinforced concrete building—note metal window frame

Building No. 15, and the first story of Building No. 11, temperatures in excess of 2,500 degrees Fahrenheit were reached.

The behavior of the concrete under the usual conditions of this fire fully demonstrated that it is an admirable material for fireproofing purposes, because of its very low heat conductivity and its toughness.

The intensity of the fire and the rapidity with which it traveled through the buildings subjected the concrete to extremely rapid expansion. Building stone, under similar conditions of rapid expansion, splinters and spalls, and, while concrete is much tougher, it is subject to the same action. This action is proportional to the brittleness of the material. Under the conditions prevailing in a fire of unusual severity there is an opportunity for concrete to adjust itself to increases in temperature and the danger of spalling is, therefore, greatly reduced. In the greatest portion of these buildings the concrete remained firm and hard and intact after this severe heat treatment.

There was an apparent lack of stiffness in the floors, which was undoubtedly due largely to the casting of the slabs and beams and girders separately, which was probably a contributing cause to the sagging in some of the floors. Reinforced concrete is most efficient as monolithic construction, and buildings of this character require, in order to develop the full strength of the structure, a positive bond between the slab and the floor frame.

Thomas A. Edison stated recently that of the seven reinforced concrete buildings comprising a part of his plant, only 12½ per cent of this type of construction was damaged by the fire which occurred at his works. He said that of the machinery contained in these buildings, 98 per cent was saved and is



RAPID CONSTRUCTION

A six-story and basement building, 440 by 180 feet, on pile foundation, completed in nine months. Here one entire floor of 80,000 square feet was concreted in five days. Builder, Turner Construction Company. Architect, Cass Gilbert

now in operation. His statements are strikingly illustrated in the accompanying picture of the plant taken immediately after the fire occurred. In the background of this picture are shown several of the surviving reinforced concrete buildings. These structures, with their highly combustible contents a mass of flames, became for the time being so many huge stoves or furnaces, but, as stated by Mr. Edison, they passed through the ordeal with very superficial damage.

The first scientist of note to give publicity to the value of reinforced concrete as a fire-resisting material was Professor Ira H. Woolson, formerly of Columbia University, now Consulting Engineer for the National Board of Fire Underwriters. Professor Woolson pointed out that certain laboratory tests upon small specimens of concrete did not in any sense correspond with the behavior of concrete under practical conditions. He announced, after a series of experiments, that the thermal conductivity of concrete was among the lowest of all our structural materials, and that in a building constructed of concrete throughout, a fire would be likely to consume the contents before heat could penetrate the concrete to the degree that the metal imbedded therein would be seriously affected

son as to the feasibility of building storehouses at moderate cost that will withstand the fiercest conflagration."

Some years ago the United States Geological Survey conducted a series of experiments upon panels made from various concretes. These panels were laid up in the form of masonry and subjected to a heat of 1,700 degrees Fahrenheit for a period of two hours. At the expiration of that time they were drenched with water. There resulted merely superficial damage to the concrete. Paper labels on the backs of the specimens were not even scorched. Cinder concrete possesses great fire-resisting properties. Hence its extensive use in many large modern structures. Professor Woolson tells the story of a cinder concrete test house used for the purpose of testing other materials which passed through tests aggregating twenty hours. These were made at different times with temperatures ranging from 1,900 degrees to 1,700 degrees Fahrenheit. At the end of each four-hour test, and while the walls were red hot, a stream of water at 60 pounds nozzle pressure was played back and forth over the ceiling for ten minutes, but the walls remained intact, damage representing only the most

COMPARATIVE APPROXIMATE YEARLY COST OF INSURANCE IN CENTS PER \$100 OF FACTORY BUILDINGS

Exposures none; area not large; good city department; no private fire apparatus except such as pails and standpipes

	ALL CONCRETE.		BRICK MILL CONSTRUCTION OR OPEN JOISTS.		WOOD MILL CONSTRUCTION OR OPEN JOISTS.		Add for Brick or Wood Buildings in Small Towns and Cities Without Best of Water and Fire Departments.
	Building.	Contents.	Building.	Contents.	Building.	Contents.	
General Storehouse.....	20	45	50	100	100	125	25
Wool Storehouse.....	20	35	40	60	75	100	25
Office Building.....	15	30	35	50	100	125	25
Cotton Factory.....	40	100	100	200	200	300	50
Tannery.....	20	40	75	100	100	100	25
Shoe Factory.....	25	80	75	100	150	200	50
Woolen Mill.....	30	80	75	100	150	200	50
Machine Shop.....	15	25	50	50	100	100	25
General Mercantile.....	35	75	50	100	100	150	25

or destroyed. Professor Woolson's theory has been sustained in a number of fires involving concrete structures. Up to date no reinforced concrete building conforming to the highest standards of engineering practice has been destroyed by fire. One of the most remarkable tests of this character occurred during the Salem fire. Among the large plants destroyed was that of the Naumkeag Steam Cotton Company. This plant included a storehouse of concrete. It is shown in the accompanying illustration standing among the ruins of other buildings. In its report of this fire, the Manufacturers' Mutual Fire Insurance Company, Providence, R. I., made the following statement: "This building, although surrounded on all sides by a sea of flames, came through the fire practically uninjured. It is a most instructive object les-

superficial spalling of the surface. Furthermore, these walls were only four inches thick.

The foregoing does not imply that cinder concrete is suitable for such parts of a building as encounter great stress, weight or vibration. It is here considered merely as a fireproof coating. Furthermore, cinder concrete must be of the best quality of cinder and the concrete must be properly proportioned, mixed and placed. Its most common use is in the form of slabs.

Where a building is of concrete throughout, water from sprinkling systems or the hose used by the firemen, cannot pass through the impervious concrete floors and deluge the contents on the floors below. Water damage frequently represents serious loss where floors are of a type which allows leakage.

A further great economy of concrete as it concerns

fire damage is the small outlay required for repairs. For example, the columns in the Edison buildings were of the square type. The intense heat affected the sharp corners of the columns, making them appear seriously damaged. Upon investigation, however, the cores of the columns were found to be entirely sound and repairs involved a wrapping of spiral reinforcing, which was again imbedded in concrete.

In a fire which occurred some years ago in the reinforced concrete factory of the Dayton Motor Company, Dayton, Ohio, temperatures were so high as to melt down brass machinery parts, but the damage to the building was so light that within two days after the fire new machinery was installed on the burned-out floor and manufacturing operations resumed throughout the building. When the Tunnel glue plant, in Philadelphia, was destroyed by fire some years ago, a reinforced concrete building emerged from the test practically intact. Repairs consisted of patching slightly pitted surface of the concrete and the insurance adjusters were served with luncheon in this building the day after the fire.

Concerning insurance, it is difficult to give a correct idea of the actual rates of typical concrete buildings, but the accompanying table, prepared by Mr. L. H. Kundhardt, of the Boston Manufacturers' Mutual Insurance Company, gives comparative rates for different classes of buildings. The data is taken from typical examples throughout the United States, and the table is based upon absence of automatic sprinklers and other approved fire-protective appliances of the usual completely equipped building. They are not schedule rates, but may be taken as an approximation of actual costs under favorable conditions.

But aside from pecuniary considerations there is a far more important matter—the preservation of human life. In the construction of school buildings, hotels and large apartment houses, the use of a fire-resisting material is imperative. Perhaps the most interesting example of reinforced concrete hotel construction is at Atlantic City, where, taking its highest elevations, there has been erected the second tallest

reinforced concrete structure in the country. A reinforced concrete tower on one of the Robert Gair buildings in Brooklyn, photograph of which is shown on another page, exceeds the hotel in height. As shown in the picture, the hotel is of reinforced concrete cage construction. The curtain walls are of hollow tile and the entire structure is faced with brick. A fire could take place in any part of this building without endangering its structural stability.

Modern Sanitary Milk Plant

H. P. Hood & Sons, milk distributors, have established at Lynn, Mass., the most sanitary and up-to-date plant for receiving and distributing milk that is to be found in New England.

The building is constructed with bearing walls supporting steel girders and beams with reinforced concrete floor slabs. Steel beams are used because in many instances the loads and spans are both large enough, so that the engineers did not want to use the sizes that would be required for concrete beams.

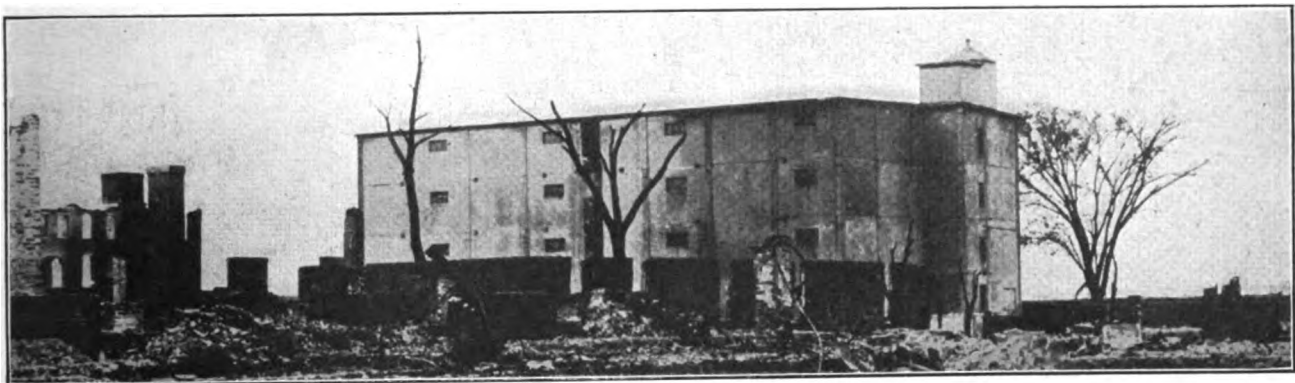
The main office and observation room are on the second floor, reached through a very attractive tile-finished entrance and stairway.

Wherever milk or water is used, the floors are waterproofed, and granolithic finish is used throughout, very generously mixed with Master Builders hardener, although in many places it was necessary to use cast-iron gratings, so set as to help protect the wearing surface, for it had been determined that there is no other business giving more severe wear to floors than the handling of milk from the farmer to the consumer.

Appleton Storehouse, Lowell, Mass.

Charles T. Main, of Boston, Mass., was the engineer, and the work was executed by the New England Concrete Construction Company, also of Boston. This is one of the few ten-story buildings in New England constructed entirely of reinforced concrete without structural steel columns. It was built to the satisfaction of the Factory Mutual Insurance Association and sprinklered according to their requirements.

(Continued on page 123)



A TRIBUTE TO REINFORCED CONCRETE

The storehouse which survived the Salem fire. Proper roofing, window protection and concrete saved this building

The Era of Rapid Construction



Work
Started
March
25th



THE sudden demand for many kinds of manufactured materials, owing to war orders and increasing foreign shipments, is responsible for a great amount of rapid construction of factories and warehouses.

It is somewhat surprising to note that much of this construction is of a permanent nature, well designed

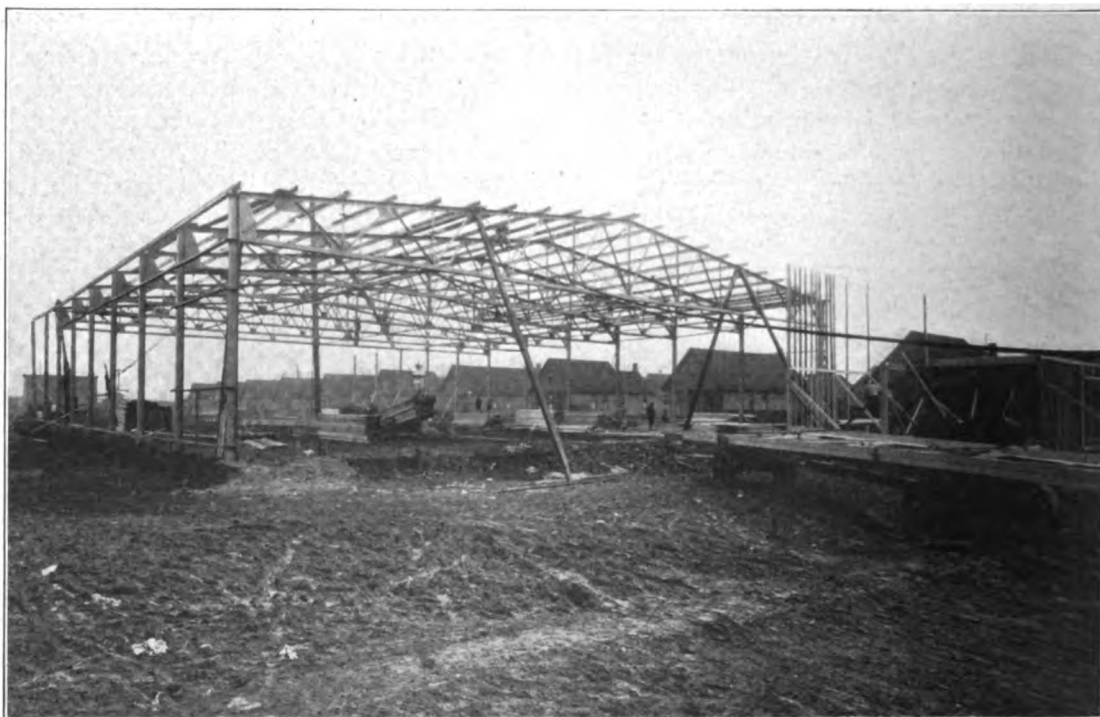
and of good materials, built to resist fire.

At Bridgeport, Conn., about 40 large factories and many houses for workmen are being erected.

Buffalo is also developing rapidly along these lines, and of particular interest is a review of the extraordinarily rapid construction of the Curtis aeroplane plant, progress photographs of which are shown herewith.



April
2nd

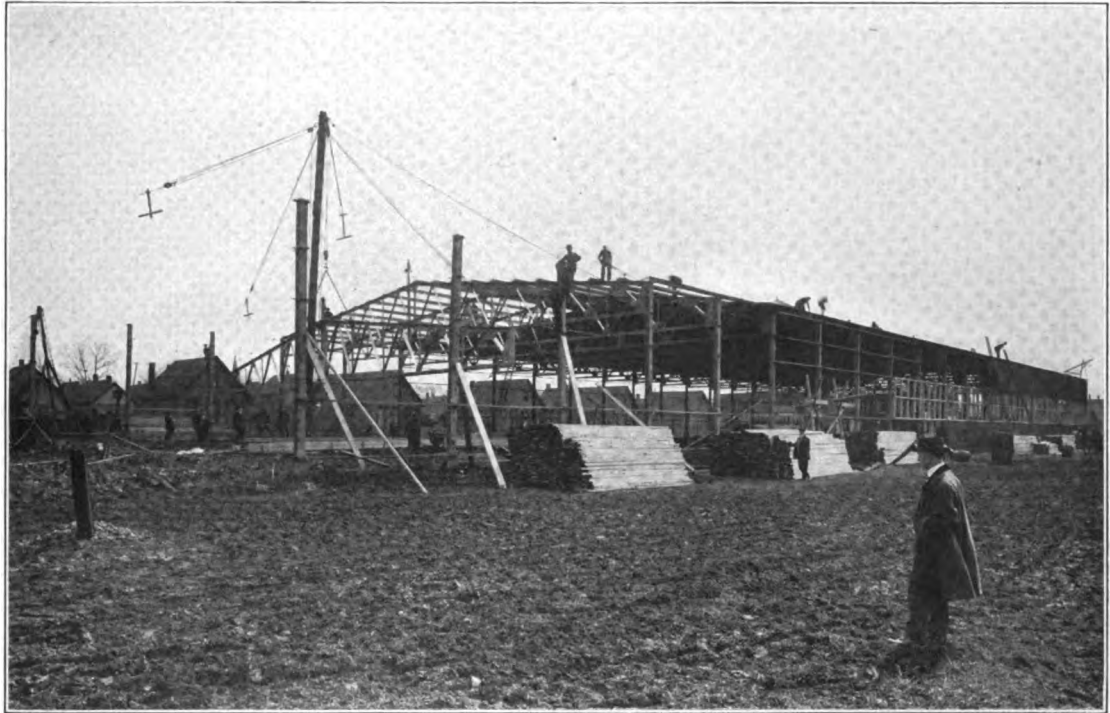


The building is 100 feet wide and 600 feet long, with steel side columns and 100-foot trusses, in order to leave large unobstructed floor spaces.

the evening of March 23d, building to be ready for occupancy by May 1, allowing 37 days for construction. This required rapid fabrication of steel.



April
7th



The steel work for the plant was fabricated and constructed by the Ferguson Steel & Iron Company, of Buffalo, in less than six weeks' working time to enable the general contractors to complete the entire building in approximately the same length of time.

CONSTRUCTION OF FIRST SECTION

Contract was signed for the building at 7 o'clock on

Two days later, in a driving rain, surveyors and excavators started work. Picture taken March 25th shows site of building.

April 2—Ten days after signing contract, seven 100-foot trusses may be seen in place.

April 7—In 14 days, 21 pairs of columns and 18 trusses detailed, fabricated, delivered and erected.



April
13th





May
6th



April 13—Steel work on first section complete.
Time for construction—20 days. Ahead of time specified—17 days.

CONSTRUCTION OF SECOND SECTION

Owing to delay of railroad company in installing a switch, work on the second section was not started until May 6.

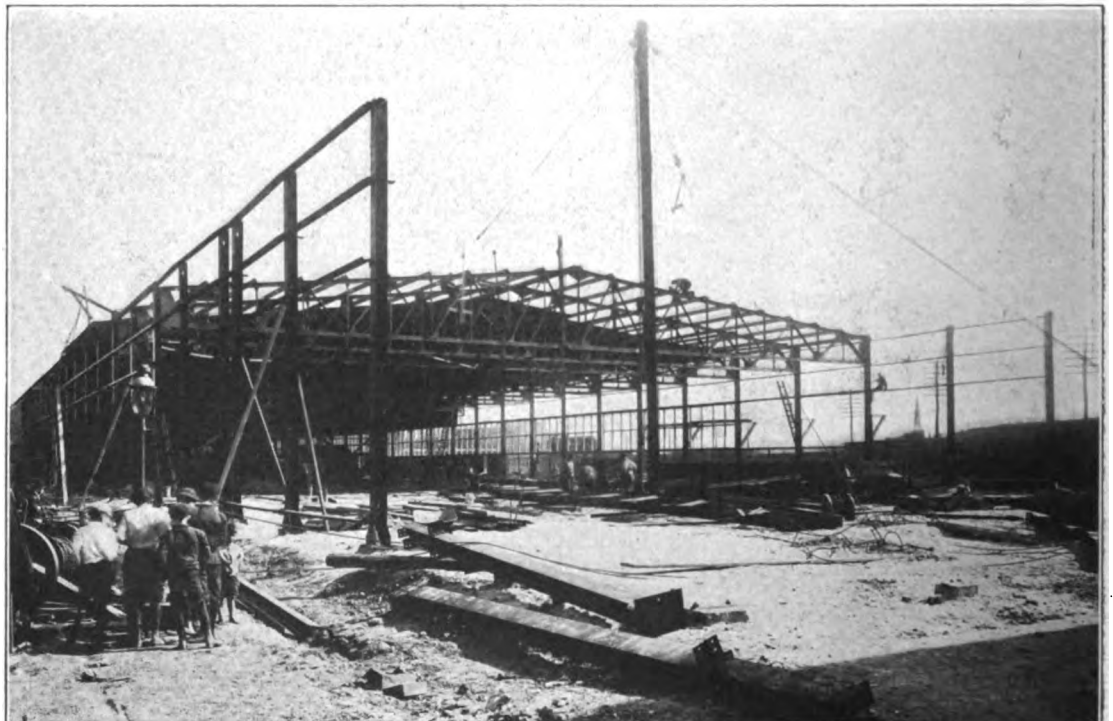
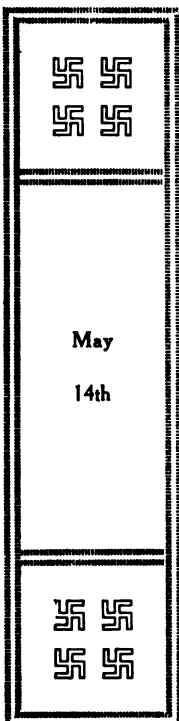
May 14—The 100-foot trusses were shipped in two sections and riveted together on the ground

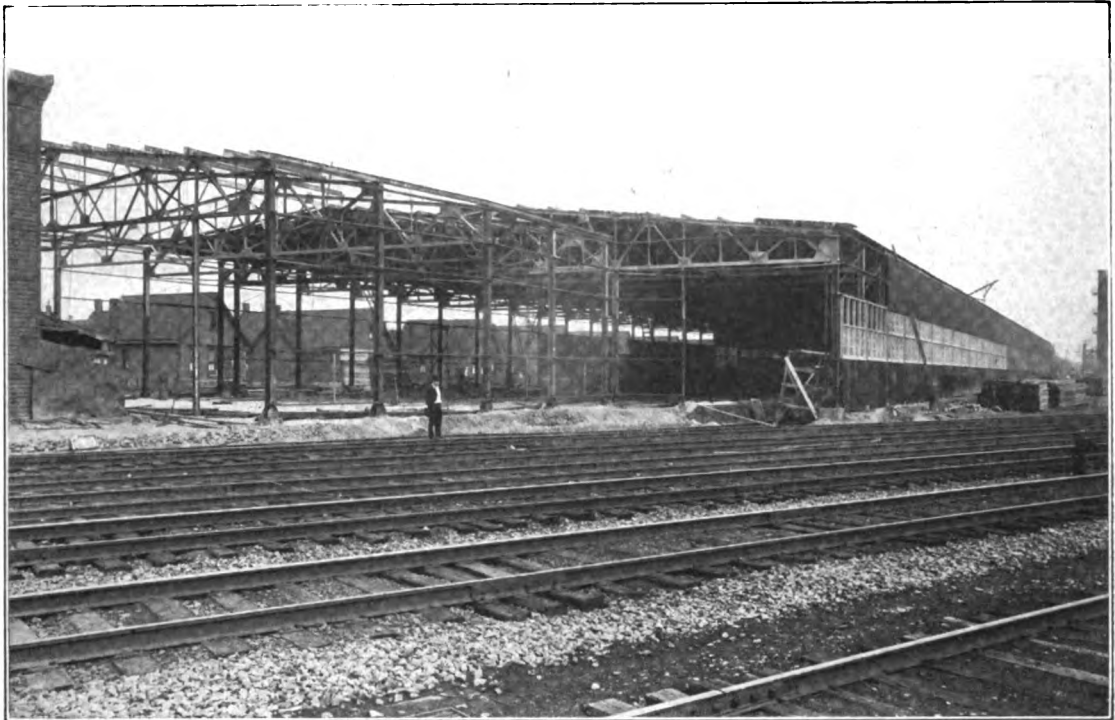
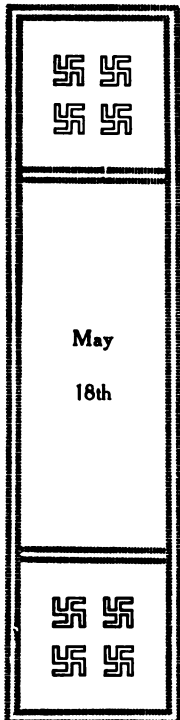
before hoisting into place, saving time and labor.

May 18—The steelwork was erected in such a way as to permit the other contractors to follow closely without interference. Steel all in place in building 100 feet x 600 feet.

May 22—The biggest "bird-house" ever built. Showing interior view of completed building, covering 60,000 square feet floor space, every foot of which is utilized in the manufacture of flying machines.

The rapidity with which a structure of this type can





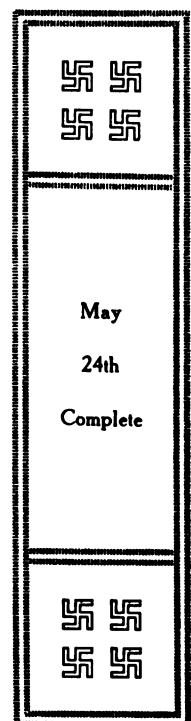
be constructed makes it possible for manufacturers to take contracts which would otherwise be impossible to handle.

Modern efficiency methods adopted after careful analyses of factory, office and general working conditions have made it possible to construct buildings with almost unbelievable rapidity. Great office buildings capable of housing the population of a small city, are erected in a few months' time. Transit lines are laid out and completed in the same manner. Effi-

ciency, modern methods, system—these are the strong factors which are introducing the era of rapid construction.



In the erection of its projected plant at Springfield, Ill., the Western Cartridge Company will spend close to \$400,000. The concern is now erecting eight new buildings at East Alton, these being required to care for its "war orders."





The Editor's Page

*IN the busy hours of every day
We pause—
To analyze and weigh
A striking word, or deed, or
thought.*

The Tin-Clad Fire Door

THE new book of regulations of the National Board of Fire Underwriters makes special mention of the necessity for cutting vent-holes in tin-clad doors. It is stated that this hole will prevent excessive bulging of the covering and rupture of joints between plates by the pressure of gas generated in the wood core when the door is exposed to fire. Who is to provide the vent-hole? Where have they been provided in the past? This is a dangerous condition.

As stated at a National Fire Protection Association meeting recently held, the manufacturer ships the door without reference to the direction in which it is to slide. Therefore he does not cut the hole. It is left to the owner or his representative to do this, with the result that it is often not done.

The tin-clad door is not a satisfactory fire-stop. It is liable to rapid deterioration, due to rusting of the tin covering and rotting of the core. It is easily damaged, short-lived and particularly dangerous in that, after having been installed for a comparatively short period of time, although it still gives the appearance of fireproofness, it may be unsafe.

A careful comparison of the new National Board regulations with those of a few years ago will show that other and better types of doors, such as asbestos-filled steel and hollow metal, are coming rapidly to the fore and their use is strongly advised. The only argument for the tin-clad door is its initial cheapness, and there can be no doubt that cheap material is the dearest in the long run. Count the ultimate cost!



The Attitude of "Construction" Toward Wood

THE lumber interests are bestirring themselves. At every meeting a question of great interest is that of the inroad on the sales of lumber for building construction, resulting from the increasing use of "substitutes" for wood in building construction. It is noticeable, however, that far-sighted and broad-gauged lumbermen are becoming interested in the question of the part played by wood in the fire-losses which constitute such a heavy burden to be borne by the people of America. It is a subject which should be treated openly and fairly; and above selfish interest should be placed national welfare. As wood is the great contributing cause for the fire-loss, why not meet the issue squarely? Instead of spending thousands of dollars to prove that wood should be used extensively in building construction, when on every hand plain evidence of a contrary condition is to be had; and when every lumberman knows in his heart that he is backing the losing side—why not seek new outlets for the product? Could not the energy and money which are being directed against public welfare be put to better use? It would seem that this effort

could be better directed as a matter of selfish interest.

Attempts have been made to fireproof wood—by extracting the sap and injecting chemicals, by covering it with metal, even by forcing in chemicals under heavy pressure. None have proved satisfactory. The cost is too great, or in the case of the metal-covered door the wood within rots, the thin sheet of metal rusts and the door is useless as a firestop within a few years.

There is no bitterness, no personal animosity toward the lumber interests, in the strong stand which is taken in the matter of using wood in the construction of buildings. We *know* that it is not necessary to use it, except perhaps in the rational manner in the interior decoration of the reasonably priced home. Thousands of fires have taught the lesson that wood is the basis of the great annual fire-loss. Wooden shingles pave the road over which the conflagration travels. Wooden trim and doors and window-frames invite the course of fire through the many so-called fireproof buildings. The proof is always available. Study the average fire—is wood a factor?

Eyes That See Blindly

Is the eye of the average American so dazzled by the glitter of the almighty dollar that he, too, "sees blindly"? It would seem so.

The Editor's window overlooks the reconstruction of Hammerstein's Victoria Theatre, that Mecca of the vaudeville performer, which has now become a memory of Broadway. Following the popular trend, on its site the new Rialto Theatre is being built—a moving-picture house.

So much for the passing of the old and the coming of the new—it is the way of the world; but to the keen observer the demolition and reconstruction of this building offer much food for thought.

A builder of national reputation stood at the Editor's window yesterday watching this work. After a few minutes of speculation he turned and said:

"Why don't you begin the great reform there? Charity, you know——"

Then his voice lost the jesting note.

"Do you know, I've been in there a hundred times; my family has been there, and I never before realized the danger."

"The Editor walked over beside him and both watched the work for many minutes. The steel framework for the new stage was being erected; but of more interest was that part of the old structure which had been left by the wrecking crew. Wood floors, supported by rusty, unprotected metal members—the remains of exit facilities reminding one of the

plan of the Iroquois Theatre at Chicago; piles of wood salvage cumbering the ground. Just to the right, three kitchens of as many large restaurants smoked industriously. Within recent years three fires have occurred in these buildings.

What might have resulted from a quick adjoining fire, when the theatre was crowded, no one knows. That there has never been an opportunity to find out is something to be thankful for. No one knew that anything would happen in case of a fire in the Iroquois Theatre. We all know what *did* happen!

"But," you ask, "what has all this to do with 'eyes that see blindly'?"

Just this—the greatest obstacle which stands in the way of the reduction of the annual fire loss and the spread of the splendid doctrine of consistent fire-safe building construction is that trait peculiar to our people—the lack of what might be called a "sense of connotation."

To the passer-by, the tearing down of an old building teaches no lesson—to the average newspaper reader the fire items have no interest; merely "another fire." A severe object lesson seems necessary to point out the real danger of fire—how near it is to all of us. We know fire too well; we have come to expect it; it is part of our national life. Truly, the public must be "taught to learn"—then only will the "eyes that see blindly" open, and a concerted national movement for the eradication of this evil be commenced.

The Watchman—The Human Equation

The people of Richmond, Va., awoke on the morning of October 10th last to view the devastation wrought by the most disastrous fire which has visited that city in many years. Three firemen were killed in fighting the flames.

The buildings destroyed were the warehouses of the Crenshaw Tobacco Company, several adjoining buildings and a row of wholesale houses on Virginia street, where burning embers fell on inflammable roofs.

The fire gained headway because of the lack of sprinkler and alarm systems. The work which they would have done quickly and unfailingly was left to two watchmen. Here entered the human equation. One watchman went for sandwiches, the other fell asleep and was awakened by the *heat of the floor underneath him*. That heat would have opened sprinkler-heads when the fire was still an incipient blaze, *if the building had been sprinklered*; alarms would have rung out, half a million dollars and three lives would have been saved!

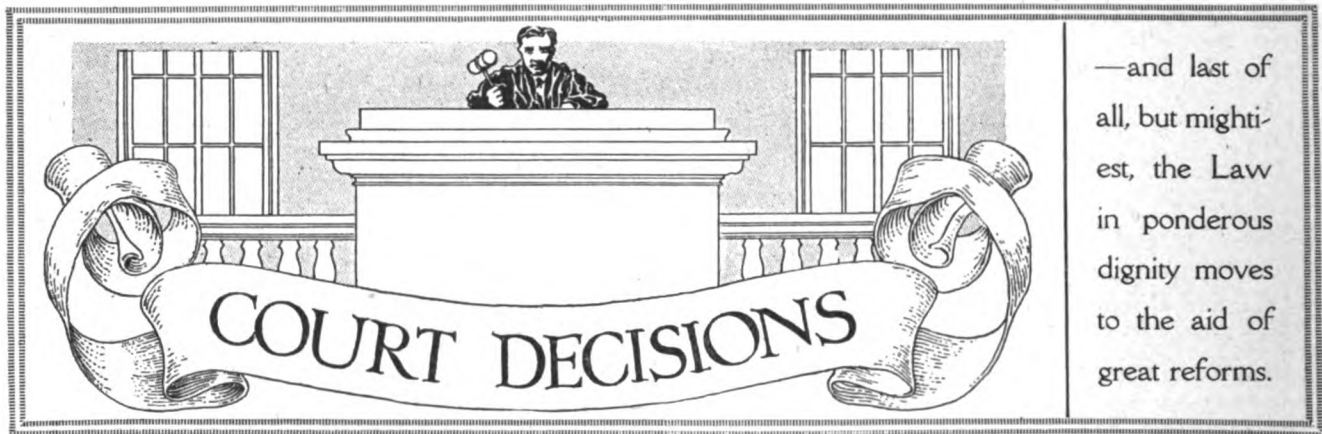
The Menace of the Wood Shingle Roof

(Continued from page 87)

It is the plain duty of the building profession and the makers of laws and codes governing building practice to advise and legislate against the use of any type of inflammable roofing, and the sooner this movement assumes a strong national aspect and its forwardance becomes a public duty, the sooner will Salem, Chelsea, Bangor and other great conflagrations close the history of criminal negligence of the American people who are to-day placing business interests before safety in the home, and dollars and cents before the safety of business interests.

What of the inflammable roofing question in your neighborhood?

"I am firmly convinced that the time has arrived when the protection of all openings and the installation of sprinkler systems should be compelled by law in the congested districts of all our great cities."—R. M. Potts, Superintendent of Insurance in Illinois, before the Fire Marshals' Association.



Prompt Notice of Injury

Section 37 of the Workmen's Compensation Law of Maryland requires that an employee give his employer notice of injury within ten days after it was sustained. This provision, the State Industrial Accident Commission announces, will be strictly enforced hereafter, and those failing to observe it will have great difficulty in recovering claims. In explaining its attitude, the commission said:

"The first step obviously is to ascertain the causes of accidents, so that they may, if possible, be removed, and in most cases no one is in better position to know the cause of an accident than the employee who has been accidentally injured. The law, therefore, very wisely requires that the employee shall bring this fact to the attention of his employer, as well as the fact of his injury.

"When this is done the law next casts upon the employer the duty of giving such care and treatment to the injured employee as may, as speedily as possible, restore him to the ranks of the employed, the insurer, in the meantime, within certain limits and under certain conditions, becoming liable for the expense of such care and treatment, and also for the compensation which the law provides for the loss of earning power."

Must Be Warned of Risks

That labor employers must warn their employees of any unusual hazard introduced into their work has been repeatedly held by the courts in deciding damage cases. The most recent ruling in that respect was given in the action of the heirs of one Brady against the contractors of the Blackwell's Island Bridge, in New York City. Brady, an ironworker employed upon the structure, while walking along the projecting ends of some ties which had been laid across the floor beams, stepped upon a particular one which tilted up, throwing him into the river and causing his death. It developed that from the middle of the tie in question a piece had been cut to permit the binding of a guy rope. Thus weakened, the tie proved insufficient to

sustain Brady when he stepped upon it, and was responsible for his death. Unless it could be clearly shown that Brady had been advised of the special hazard in question, the court held his employers would be responsible for proper damages.

Protect Danger Spots

In rendering judgment a short time ago against T. F. House, and others of Louisville, Ky., for \$10,000 damages for injuries suffered by the three-year-old son of John L. Ackerman, Judge Carroll, of the Court of Appeals, held in part that: "When an ordinary sand pile, located in a place accessible to children, is converted into a place of great danger, as, for instance, when a bed of slaking lime is put in the middle of it, the person who converts this place of perfect safety into a place of extreme danger needs to be careful how he protects it."

Ohio State Buildings Exempt

According to a ruling by Attorney General Edward C. Turner, of Ohio, "the mechanics' lien law does not apply to the construction of State buildings."

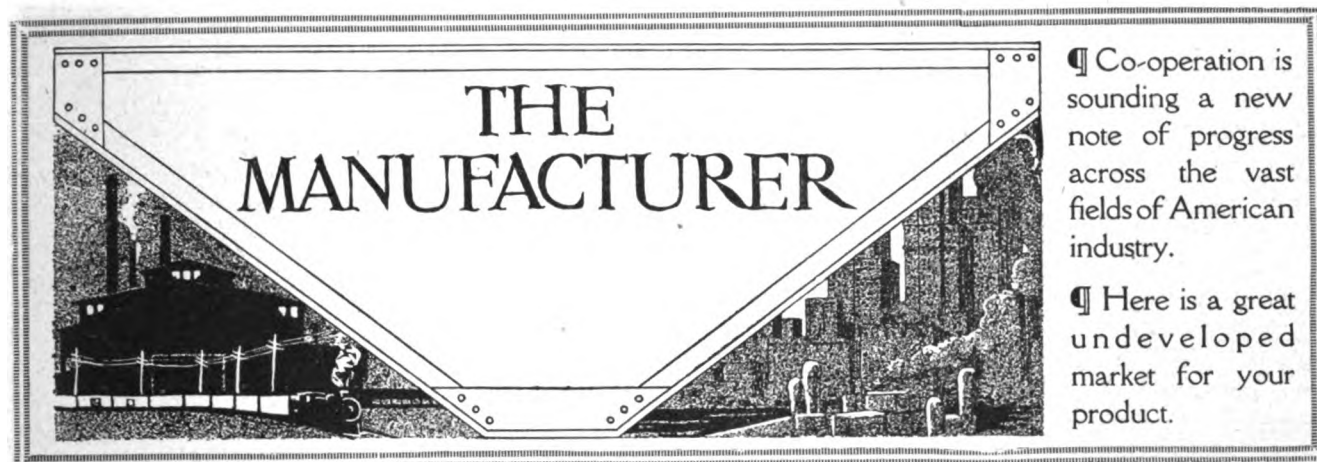
Compensation Law for Kentucky

At its recently held annual convention the Kentucky Manufacturers and Shippers Association went on record as favoring "a just and equitable" workman's compensation law for the State, and instructed its special committee, which has been studying the question for some time, to continue its labors.

Shares in Damage Award

Under the conditions of the New Jersey Employers' Liability Act an unborn child may share in damages awarded for the death of its father. Decision to that end was rendered by Judge Harry V. Osborne, of the Common Pleas Court at Newark a short time ago in the case of Torsiello vs. the Public Service Company.

At an estimated cost of \$125,000, the Benevolent Knights of America plan to erect a headquarters building at New Orleans within a short time.



Co-operation is sounding a new note of progress across the vast fields of American industry.

Here is a great undeveloped market for your product.

THE OPPORTUNITY FOR CO-OPERATIVE SELLING

For many years the manufacturers of fire-resistive building materials and safety equipment have felt the need of an organization capable of conducting an intelligent and vigorous campaign to combat the activities of the interests that thrive upon inflammable construction.

In practically every community in the United States and Canada it is easier to buy or rent a frame house than one of brick, tile, stucco or cement. Ready-to-occupy houses are almost invariably of frame, and the man who plans his own home will have a dozen carpenter contractors after the job, while there is no bid for the work on the part of the mason contractor.

Surely, the carpenter cannot be blamed for this condition. In his activities he is aided by the lumber dealers, who furnish him with stock plans and extend credits that materially help him to handle a large volume of business.

In many cities it is customary for the lumber dealer to take a second mortgage upon the property to cover his account, and thus with a small capital the carpenter builder is able to carry several operations at one time.

Everything is done by the lumbermen to make it easy for anyone to build or buy a frame house. The lumber interests must be commended for their enterprise.

Not until the manufacturers of the permanent materials match the lumbermen in this respect will the fire-safe house be as easily acquired as the frame house. In addition to a campaign of education there must be some active effort to co-operate with the mason contractor and the builder of masonry houses.

The business efficiency schools have worked out

St. Louis, Mo., is to have an opera house that will be one of the most artistic in the country, providing present plans mature. A group of wealthy citizens are behind the project and have announced their determination to carry it through.

what may be called the formula of a sale. There are four steps, according to the Sheldon teaching:

Favorable attention;
Interest;
Desire;
Action.

Any intelligent statement of the economy and safety of homes built of permanent materials at once attracts the *favorable attention* of the man-about-to-build.

Developing this *attention* by giving comparative costs and detailing the advantages of safe construction, such as lower fuel bills, lower depreciation, lower up-keep and insurance, readily leads to the second step—*interest*.

The *interest* ripens into *desire* as the prospective builder becomes convinced of the truth of the statements about safe construction—then what happens?

How is *action* to be obtained and the transaction successfully closed?

The prospect goes out to talk with a builder of his acquaintance, and in ninety out of every one hundred cases that builder is a carpenter, acquainted only with frame construction. The builder argues for his own class of work, naturally. Through ignorance, or something worse, he often misleads the prospect as to the relative cost of the two types of construction. He shows the prospect any number of completed houses that he has erected, and offers to duplicate any one of them at a certain definite price. Against this effort of the carpenter there is none to uphold the side of safe construction; none to show him completed brick, tile and cement houses and offer to duplicate them at a fixed price. The result is that, with three steps of the sale successfully negotiated the prospect slips back because the fourth step is not completed.

Every manufacturer of fire-resisting material knows that this condition is general throughout the country. Occasionally there have been spasmodic efforts to correct it. A few brick or tile house plans have been circulated by those interested in the sale of the materials.

The effort never has been consistent and continuous, and back of it all was a selfishness exposed in a desire to sell a certain material, and if possible displace an equally desirable and safe material.

The need of a broad movement, free from trade connection, working fairly in the interest of all permanent materials, has long been felt, as has been stated.

More than one hundred manufacturers of national standing have recognized in the Society Advocating Fire Elimination the agency to carry out this important work. These concerns have given their hearty support to the organization, and it is doing all that is possible with this limited support.

This organization is spreading literature and newspaper publicity throughout the United States to attract *FAVORABLE ATTENTION* to safe construction. It follows up every inquiry, no matter from what part of the country it comes, with personal letters and other literature to ripen the *ATTENTION* into *INTEREST*. It is equipped with comparative costs resulting from actual operations, and volumes of evidence of the advantage of safe construction, which is used to bring the prospect up to the third step—*DESIRE*.

And, what is most important, in localities where the support permits it, is completing the transaction by bringing the prospect and the mason contractor together and staying on the job until a fire-safe house is built.

There are ten thousand manufacturers of fire-safe building materials in the United States and Canada who should support the S-A-F-E movement and carry to all America the effectual work now being done in a limited territory.

It is not an experiment. It has proven a success.

If one-half the ten thousand eligible manufacturers would come into the S-A-F-E at an outlay of less than fifty cents a week each, plans and specifications of a variety of safe houses of moderate cost will be placed in the hands of mason contractors and supply houses throughout the country so they might render to the prospective builder the same service that his brother carpenter is now giving. It will be made as convenient for the man-about-to-build to get reliable information as to costs and to get bids for the work as it is now for him to get information upon frame construction.

Fire Losses and Rebuilding Plans

MONTGOMERY, ALA.—While the exact cause of the fire that destroyed the plant of the Oxygen Soap Works is unknown, the theory is that it developed in the dryer. The loss is given by the management at \$25,000. At last accounts rebuilding had not been decided upon.

HAPEVILLE, GA.—Loss upon the public school is figured at \$10,600, with an additional loss of \$400 upon equipment. "The destroyed building was a brick veneer, erected in 1912, and its loss was in no sense the result of improper construction," according to the authorities. It is hoped to have a new building erected along the same plans as was the one destroyed, completed by the first of the new year.

BUCKSPORT, ME.—What its owner figures will be practically a fireproof structure is being built to replace the Emery Hall block, burned in September last. When completed the new building will contain a theater, a series of stores and a number of office rooms.

DAYTON, OHIO.—Fire originating in the plant of the Apple Auto Company on October 12 caused damage estimated at \$20,000. The management planned to rebuild at as early a day as practicable.

BOSTON, MASS.—Had the building on Troy street occupied as a warehouse by the prominent department store firm of R. H. White & Co. been other than "fireproof in every sense of the word, it would certainly have been totally destroyed as the result of a fire on the 7th ultimo," according to the management. Fire from an unknown cause broke out among the highly inflammable furniture stored on the sixth floor, and though causing a loss of \$8,000, was yet confined to the floor of its origin. So satisfied are Messrs. White & Co. with the result of the grueling test to which the building was subjected that they will have the damaged portion repaired strictly along former lines.

MINNEAPOLIS, MINN.—An aggregate property loss of \$165,000 resulted from the recent burning of the terminal elevator of the Northwestern Elevator Company. The original wood house, built in 1883, and having a capacity of 750,000 bushels, was valued at \$125,000, while the 300,000-bushel annex, erected in 1888, was worth \$40,000. What caused the fire

has not been determined. While the rebuilding programme has not been fully agreed upon, consideration has been given the erection of a fireproof working house of between 100,000 and 150,000 bushel capacity and a 1,000,000 bushel concrete storage tank.

BALDWIN CITY, KAN.—Improper insulation of electric wires is thought to have caused the fire that destroyed the Kappa Sigma House of the Baker University early in October. The building was made up of a series of additions to the original property. Twenty thousand dollars, it is figured, will safely cover the loss.

TECHNY, ILL.—While the loss of the building occupied by the Society of the Divine Word a short time ago is placed at \$15,000, the committee in charge figure that its replacement will cost at least \$25,000. Whether the rebuilding programme will be carried out will be determined later.

STATE COLLEGE, PA.—Concrete floors and fire wall prevented the spread of the fire that developed in the stock room in the Dairy and Creamery Building of the Pennsylvania College on the 15th ultimo, resulting in damage estimated at \$8,000.

SEARCY, ARK.—Incendiarism is suspected as having caused the fire in the plant of the Searcy Spoke & Felloe Company, which was making up walnut gun stocks at the time. The loss is placed at \$8,200.

SCOTTS BLUFF, NEB.—To replace its lately destroyed mill the Sitz Milling Company will erect a four-story and basement brick building of mill construction. The cause of the fire in the old property has not been determined.

SOMERSET, KY.—Undismayed by the burning of the Newtonia Hotel, with a resultant loss of \$80,000, S. Newton will at once begin the erection of a new building.

PASADENA, CAL.—Fifty thousand dollars was lost by the Troy Laundry Company when its building burned several weeks ago. The destroyed property is being replaced with a brick and steel structure, the roof to be of galvanized iron. "The only wood to be used in the building," says Vice-President L. G. Newly, "will be in the window casings."



THE PITTSBURGH HORROR

Fourteen lives were lost when a four-story building burned in Pittsburgh on the 25th ultimo. The structure, an antiquated affair, and condemned by County Fire Marshal Pfarr over a year ago, was occupied by a mixed and decidedly hazardous class of tenants. A feed dealer occupied the first floor, a stove and heater concern the second, a plating company the third, and a paper box manufactory the fourth floor. It would be difficult to find a more dangerous combination from a fire-inducing standpoint. The building had the accompaniment usual in makeshift structures of this sort: wooden stairways, locked doors and inadequate fire escapes. That such conditions were permitted to exist, especially after due warning had been given by the fire marshal, is a severe arraignment of the city authorities, and those responsible should, and it is to be hoped will, be held to rigid accountability. Investigations are under way, and will be useful mainly in preventing a recurrence of the disaster.

Preparing New Code

That some of the Pittsburgh officials are alive to the situation is indicated by the subjoined statement by Robert Garland, chairman of the Building Code Commission:

"No factories of any kind will be allowed hereafter in buildings which are not of fireproof construction, especially those where such heavy fire risks and so much danger exists below or within the factory, as was the case in the Sandusky street disaster."

"The Building Committee, in preparing its code," continued Mr. Garland, "intends and has already under way a classification of buildings for occupancy, under which it will be required of every building owner to maintain an occupancy condition for each classification, violations of which will cause revocation of permit."

Associated with Mr. Garland in preparing the code

are representatives from the American Institute of Architects, Builders League and various civic bodies.

A Step in the Right Direction

While Pleasant Hills, Ill., is without building laws of any kind, an arrangement has been entered into between the village trustees and the owners of the property destroyed in the recent fire whereby such of the latter as rebuild will do so with firesafe materials. One of the new structures, already under way, has concrete blocks as its supporting material, and will have a fireproof roof.

The folly of permitting wooden buildings in the commercial section of the community was made clear to the authorities and the citizens of Pleasant Hills generally when fire swept the territory on September 29th last, completely destroying the hotel, five stores, theatre and a number of other buildings. The understanding had regarding rebuilding is merely a step in the right direction and should be followed by the enactment of a code that will simply make impossible the future erection of inflammable properties.

Illinois School Buildings

According to M. J. Hoffman, assistant superintendent of schools in Illinois, "over 80 per cent of the buildings under the jurisdiction of the State superintendent of schools are lacking in one or all of the sanitary requirements imposed by the new State law enacted at the latest legislative session. They are to be given until March 1, 1917, to remedy conditions complained of, and if they are not then able to pass inspection the State appropriation for their support will be withheld."

The above criticism, Mr. Hoffman explained, applied only to old school buildings; structures now being erected being required to comply with the statute in every particular before their acceptance.

Would Compel Firesafe Building by Law

In response to the request of the Minnesota Efficiency Committee for suggestions for improving the various departments of State government, Hon. S. D. Works, insurance commissioner, offered the following admirable ideas, which, it is to be hoped, will be adopted by the Committee and later enacted into law.

Concerning fire protection, Mr. Works holds "that there should be connected with the Department (insurance) a competent inspector who should co-operate with the architects and have power to prevent the construction of dangerous buildings. A great many buildings are being constructed at the present time that are built as cheaply as possible and are veritable fire traps.

"State Buildings.—At the present time the State is insuring all State buildings. The total coverage of these approximates \$11,000,000, and yet the Insurance Department has nothing more than the power to recommend better methods of fire prevention, and the suggestions may or may not be acted upon. The State buildings are carefully inspected by the inspector under the Insurance Department, and the said Department should have the power of installing means of fire prevention that are patent and necessary.

"There should be laid down a hard-and-fast rule that no State building should be constructed unless it be absolutely fireproof. While the expense of this construction might be heavy at first, the State of Minnesota is likely to exist many years, and the buildings should be erected looking toward the future."

Has "Wood to Burn"

Scappoose, an unincorporated town in Oregon, experienced a severe fire early in August last, the post-office, several stores and a number of dwellings being completely destroyed. The burned buildings were all of wood, and, despite the rapidity with which they were consumed, it is highly probable that they will be replaced by structures of the same inflammable material, one of the prominent citizens of the community advising that "we have wood to burn in this section."

Fire Prevention Through Inspection

No matter how substantially a building may be erected, it is liable to serious fire damage if inflammable material be permitted to collect about it. The authorities of Philadelphia, appreciating such condition, provided for a systematic inspection service by specially qualified firemen some years ago, with gratifying results.

Speaking before the recent convention of the Fire Marshals' Association, Insurance Commissioner Winship, of Michigan, held that the loss record of his State would be very materially reduced if the inspection service now employed in the larger cities only was extended to the smaller communities, where, too often,

the fire menace caused by accumulated rubbish is not sufficiently appreciated. Commissioner Winship strongly urged that all governing authorities co-operate with the fire chiefs in prevention, asserting that work of this character would prove far less expensive than would the actual fighting of a fire once it be well under way. In other words, Mr. Winship believes firmly in the ounce-of-prevention rather than the pound-of-cure theory.

Old Ordinance Still in Force

It is not planned to in any way amend the present ordinance governing the character of buildings to be erected within the business district of Chateaugay, N. Y., because of the recent severe fire in the town, the authorities feeling that the law adopted years ago is sufficiently drastic. That the fire in question gained such headway was not in any way the result of improper governing ordinances, according to the municipal officers.

Wilmington, Del., to Have New Code

Under direction of the City Council, Building Inspector Anderson, of Wilmington, Del., is preparing a new building code, the sentiment of the authorities being that the ordinances now in force are very antiquated. The new laws will be in accord with modern ideas and practices.

Brawley, Cal., Preparing Code

A new building ordinance is being prepared for Brawley, Cal., according to City Clerk J. H. Stevenson.

Apartment Houses at Cambridge, Mass.

Prominent among the measures before the Cambridge, Mass., city council is one regulating the construction of three-story apartment houses.

May Enact Building Code

While the matter has not yet been fully determined, it is probable that Burkesville, Ky., will enact a building code in the near future, according to City Attorney W. G. Keen.

Alien Labor Law

Contractors everywhere throughout the country will await with unusual interest decision by the United States Supreme Court in the case before it upon appeal involving the validity of the New York alien labor law. The statute, passed to give preference on State and municipal work to American citizens, while, of course, directly applicable to New York only, is yet of concern to labor employers everywhere, for if the right of the Empire State to enact and enforce such a measure be sustained by our highest tribunal, we may confidently expect other commonwealths to adopt similar legislation.



THE AUTOMATIC SPRINKLER TO THE RESCUE

Westman, night watchman in the vast six-story storehouse of the great Universal Mills, snapped out his searchlight and turned the switch which illuminated one end of the fifth loft. He had been startled by the sprinkler system's automatic street gong suddenly ringing out while he was in the east wing. Shutting off the gong, replacing the sprinkler-head and turning on water were done and over with in 20 minutes. He returned to the fifth loft and for a moment stood staring at the sodden, half-charred mass before him. The fire, started by some unknown cause, had burned hotly for a few moments before being drowned out by the automatic sprinkler. Then he turned and gazed speculatively down the dim lengths of the aisles between the great piles of finished goods, finally glancing up at the sprinkler pipes on the ceiling.

"Two hundred thousand dollars and my job saved!" he said softly. "Another 'catch' for my assistant," and this time the glance he threw above had a hint of comradeship in it.

Having straightened out the small damage and spread out the wet material to dry, he finished his inspection of the floor and went down to the office to answer the telephone. The watchman of the nearest factory, a block away, had been calling him steadily since the alarm went off. "If your gong hadn't stopped so soon I would have been over," he said.

As Westman hung up the instrument a sense of impending danger made him turn quickly, only to receive a smashing blow on the forehead. Stunned for an instant, he fell, and when he again realized what was going on he felt his arms roughly tied behind him, and, opening his eyes, saw that the tying operation had been completed by a thick-set individual whose mask only served to bring out the craftiness of his features, while beyond him Westman could see two others kneeling before the safe.

Realizing for the first time that he was gagged, he struggled to gain his feet, only to be roughly forced

back. One of the figures at the safe straightened up.

"T'row dat rat outside, Bill!"

Westman, kicking desperately, was dragged through the intervening door and unceremoniously dumped onto the floor of the shipping-room, with the husky admonition to "lay off de rough stuff." His feet were deftly tied and he was left alone.

He lay quietly for a few moments listening to the faint noises from the next room that told of rapid preparations to blow open the safe. Then, with stunning suddenness, a thought penetrated his still dazed brain—the pay-roll! Over \$30,000 in the little yellow envelopes, ready to be given out the following morning. He wrenched frenziedly at his bonds, but they would not give. The door opened and his captor entered, looked closely at the ropes which bound him, and, administering an admonitory kick, turned with a short laugh and went out.

Westman was furious, but, realizing the uselessness of struggling, lay still, thinking hard. Presently he began twisting slowly, pulling his coat around until his hands, which were tied at the wrist, could feel the pocket.

As the groping fingers encountered a match-box, he sighed with relief; then carefully opened it, took out a match, and, getting his bearings, rolled hastily over and over to a pile of cases ready for shipment, beside which lay some unpacked goods. He hesitated for a moment, then lit the match on the rough concrete floor beneath him, bending his body in an arch to do so. The match flared up and he twisted over until it touched the pile of goods. In a moment they began to burn.

He rolled rapidly across the room and turned to watch the progress of the flames. They mounted higher and higher and attacked the pile of crates with a low, crackling which attracted the attention of those in the office. The door opened, and one of them glanced in. By this time the flame was mounting up

toward the high ceiling, and he turned with a quick warning.

"Beat it, boys, the place is on fire, and in three minutes we'll have the whole town out!" The door slammed as they rushed out and away, bent on escape. Westman was staring anxiously at the fitfully revealed network of piping above; his eyes streamed, while he choked in the smoke. Then what he expected happened—the heat gathering at the ceiling opened the sprinkler-heads and a deluge descended, drenching him and drowning out the fire. Again the alarm gong began clamoring on the street.

He rolled to the door and pressed his nose to the crack beneath to escape the smoke and steam. The other watchman stumbled over him as he rushed in.

The next morning the superintendent found a dirty but happy watchman sitting by an excellent collection of safe-breaking utensils in the office. It was Westman, and, as the super listened in amazement, he told of the first fire and how the thought of the quick work of the sprinklers there had suggested a way out of the second difficulty.

"I knew the Grinnell would work," said Westman, finishing his explanation, "and I figured that the fire would burn just enough to scare them away."

But the superintendent looked thoughtful.

"It took me six months to get the boss to put in that Grinnell Automatic Sprinkler System. He called it a lot of clap-trap pipe. I wonder what he will say to \$200,000 worth of goods saved, with a damage of \$200, thirty or forty unfilled orders avoided and burglars chased away from a \$30,000 haul? Westman, we need you in the factory; you've got brains!"

He smiled as Westman looked up at the piping overhead, and he never knew whether the "Thank you" he heard was addressed to him or to the "assistant watchman."

Saved by Wire-Glass Windows

A severe test of the fire-resistive properties of wire-glass was had at Cleveland, Ohio, on the 17th ultimo, when the Britton Building on East Fourth street burned, creating so intense a heat as to seriously threaten for a time the heart of the city's business section. Victor Sincere, owner of the Sincere Building, which immediately adjoined the blazing structure, helped the firemen in their fight with the flames.

Writing to CONSTRUCTION regarding the fire, Mr. Sincere said:

"The fire was one of the fiercest for the time it was burning that I have ever seen, and, inasmuch as only six feet intervened between the blazing structure and the Sincere building, my first impression was that we were in for a good loss. To my surprise, when I arrived at the entrance I found that our building had not

only escaped damage, aside from the cracking of some of the wire glass windows, but that the firemen were utilizing our structure as vantage ground from which to direct their water lines.

"I am sure, from what I personally saw from the inside of the Sincere building that had it not been for the admirable type of construction used plus the wire glass windows the neighboring fire would have developed into a disastrous conflagration.

"The Sincere building was erected by Roy Black, of Cleveland. It is of the mushroom type of construction, reinforced concrete. We pride ourselves upon the fact that it is one of the most substantial buildings in the downtown section of the city. Windows are placed upon three sides. The building having been planned from a fire-resistive standpoint and proved its worth in a most grueling test, should serve as a model for anyone desiring a structure that will successfully protect life and property against the fire hazard."

The burned Britton building was a six-story structure. Its destruction entailed a loss of close to \$100,000.

Manufacturers' Publicity

Stanley & Patterson, New York City, will be glad to supply anyone interested in fire alarm equipment with a copy of their intelligently prepared booklet detailing the merits of the Faraday system, of which they are the sole manufacturers. The service is intended for use in factories, schools, colleges, public institutions, hotels, theatres, apartment houses, department stores, warehouses, freight terminals, office buildings, etc., and is guaranteed free from electrical and mechanical defects for two years from date of sale.

Clinton Wire Cloth Company, Clinton, Mass.—Architects, builders and plasterers will find unusually interesting and useful the handbook issued by the above-named company. The work contains descriptions, drawings, tables, methods and specifications relative to furring, lathing and plastering, dealing especially with the use of the famous Clinton wire lath.

Hydraulic-Press Brick Company, St. Louis, Mo.—Colored photographs of the varied types of high-grade ornamental brick manufactured by this company appear in the new Hy-tex Brick catalogue. "Hy-tex brick are made of a great variety of fire clays, red clays and shales, which are either used separately or mixed in varying proportions. After due tempering and grinding, this material is subjected to one of three processes of manufacture: Dry-press, under a forty-ton hydraulic pressure; wire cut, in stiff mud machines; or sand mould." To aid in brick designing, the Hydraulic-Press Brick Company has issued for the especial use of architects a booklet entitled "Bonds and Mortars in the Wall of Brick."

SAFE HOMES



A DEPARTMENT OF "CONSTRUCTION"

Devoted Exclusively to the Interest of the Home Builder

Edited by Ralph P. Stoddard



WHILE there is no more enjoyable experience than planning a home, it is doubtful if there is a more unpleasant one, in popular conception, than the actual building of the house. Nearly everyone approaches the operation with dread.

For years a man and his wife will study the house plans as they are published from time to time in the Sunday newspapers or the monthly journals, and they delight in making imaginary changes in these designs to have them suit their taste and need.

When the time comes for action they usually decide to look over a few of the ready-built houses advertised in the paper before they talk with the architect. If the real estate salesman is a shrewd one they buy, waiving many of the features that they had fondly dreamed of enjoying when they had "a home of their own."

It has become a part of the real estate house selling talk to discourage the prospects from entering upon a building operation on their own account.

"A friend of mine," relates the salesman, "just built a house, and it cost him so much more than he anticipated, etc."

It may all be true, too, for none can deny that those things happen frequently. Many times the owner himself is responsible for the expensive "extras," and in other cases the contractor is unreliable.

With plans drawn by a competent architect and a bid upon them from a reliable contractor, there will be no extras unless the owner demands changes as the work progresses.

That there is a considerable saving to the owner who proceeds in that way cannot be questioned. The dependable contractor does not anticipate large profits. An investigation of this subject in a large number of cases proves that the average profit to the contractor is not more than ten per cent on the low- or moderate-priced house, and even less than that upon more expensive jobs.

A general contract for a house to cost \$4,000 does not carry more than \$300 or \$350 net profit to the builder. This is far below the average profit upon the ready-built house, or the speculative job "built to sell."

The speculative builder will spend \$3,000 in erecting a house upon a lot that cost him \$800. When ready for sale he charges in \$1,000 for the lot and \$3,500—as a minimum—for the house, and readily sells the property for \$4,500, or more.

Had the owner purchased his lot, paying the same price the speculator paid for it, he could duplicate the house for \$3,300, including the contractor's profit, and would save \$400.

Allowing that the speculator built of frame, as speculators always do, the owner could duplicate the house with exterior walls and roof of fire-resisting materials for the extra \$400. Instead of having a house "built to sell" and admittedly of the cheapest possible construction, he would have, for the same expenditure, a house that required practically no exterior painting or repairs during his lifetime; one that would command the minimum fire insurance rate; that would maintain its value through many years without depreciation, and one that could be economically heated, as well as always safe from external fire.

Why the speculative builder always builds of frame and the question of "easy" payments are subjects for other talks in future issues of CONSTRUCTION. They do not, however, affect the truth of the statement that the owner can have a fire-safe house, if he conducts his own operation, at the same cost he will pay for a frame house if purchased ready-built.—(Continued on page 119.)

OFFICIAL PAGE
SOCIETY ADVOCATING FIRE ELIMINATION



NATIONAL HEADQUARTERS
356 LEADER-NEWS BUILDING,
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How the S-A-F-E Gospel Spreads

A sketch and floor plan of a tile and brick house costing \$3,000 published in one of the Sunday newspapers of Cleveland a few weeks ago, brought more than fifty personal inquiries to the office of the S-A-F-E in that city. In addition there were a score of letters from other cities. Every person making inquiry was given a complete set of plans and specifications for this house and within two weeks actual work was begun on two houses from the drawings.

The plan referred to is No. 1104, printed on another page of this issue. The architect's estimate was \$3,000. This did not include plumbing, heating and lighting. One of the contractors commissioned to build the house took the job for \$3545. The other contractor's bid was \$3,680, which included a good grade of slate roof and other minor changes, which raised the price.

This is an illustration of how the S-A-F-E movement actually helps to increase the number of fire-safe houses in the country. The result does not end with the erection of these two houses directly influenced by the organization, but each house will attract the attention of hundreds of other builders and set them thinking along the right line. Invariably where one fire-safe house goes up two or three others follow in the same neighborhood. Every good house is a silent argument for the proper kind of construction.

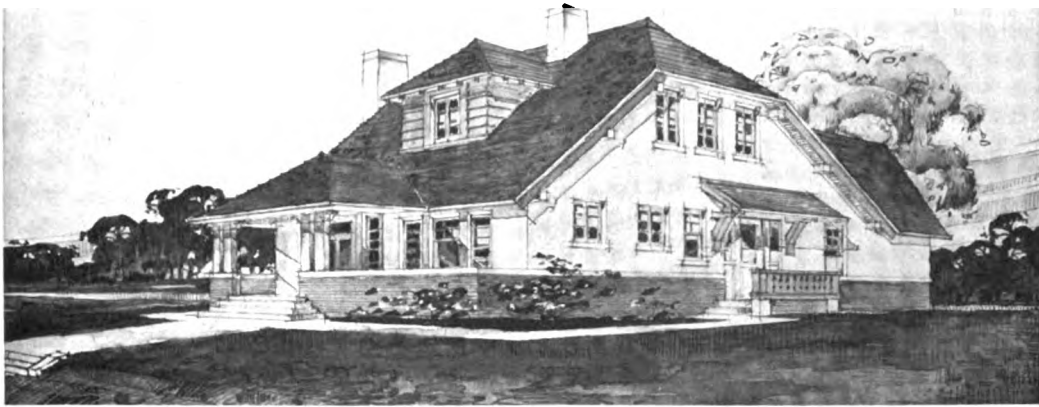
The Architect's Opportunity

The ethics of the architectural profession forbid general advertising. Frankly, there is no reason for this, and it is a hopeful sign that architectural concerns, in which the identity of the individual is lost to some extent, are showing genuine business instinct by promoting their service through publicity.

The Safe Homes Department of CONSTRUCTION, however, offers a legitimate medium for the architect to obtain valuable publicity. Prospective sketches and floor plans of houses are invited from architects everywhere for publication in this department. Not only will the architect be bringing his work before a large public of prospective builders, without criticism, but he will be aiding the Society Advocating Fire Elimination to forward its national movement in the interest of better building.

The organization back of this magazine, in its contact with the prospective builder, consistently urges the wisdom of employing the architect. Its hope of success is based upon bringing the architect and the builder together.

Photographs of houses erected, sketches and floor plans, with brief descriptions of the house and estimated cost, will be used here as their merit justifies. Of course, only houses with fire-resisting exterior or fireproof throughout are suitable for CONSTRUCTION.



No. 1106

A CEMENT BUNGALOW

HAVING two chambers on its second story, this house will meet the demand of those who wish a home of the bungalow type, but with somewhat more extensive accommodations.

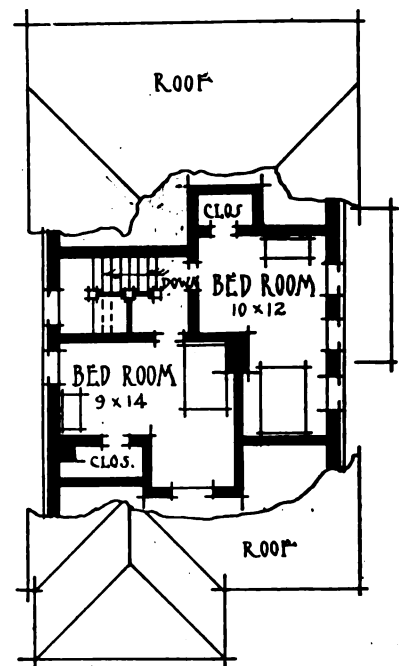
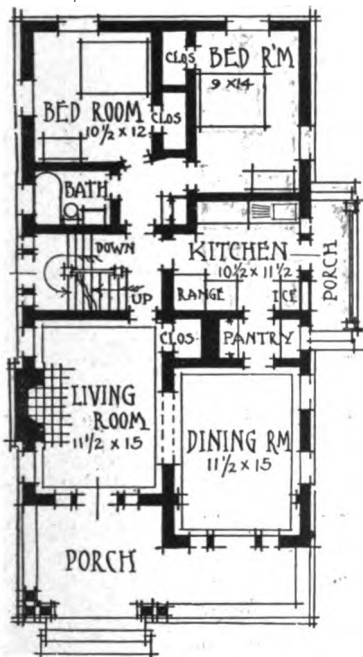
From a study of the plans it will be seen that this little residence has five ample rooms and bath on the ground floor, enough to provide for the average family.

The arrangement is convenient for the doing of the household duties—and this should be the first consideration in a home of this type.

It is designed to be constructed of hollow tile, faced with stucco. If they can be afforded, the appearance of the building would be added to by a roofing of red shingle tiles. But slate or asphalt shingles will be effective. The foundation and porch parapet walls are of red brick, laid in white mortar.

Using this construction and a good class of materials and workmanship, this little home will cost in the neighborhood of \$4,500.

It has been built in a number of places, to the great satisfaction of its owners. The John Henry Newson Company is the designer.



EDITORIAL—(Continued from page 117)

The reasons why more owners do not take advantage of this saving are, chiefly, two.

First, there is the superior selling organization of the speculative builder, always on the job to discourage the individual operation and to substitute his own ready-built commodity.

Second, the suggestion of the speculative builder that it is "an awful job" to conduct your own operation, which results in the popular dread of the undertaking.

The man who is about to build should decide that the advantages of a permanent, fire-safe house are worth the effort, and that the speculator's profit, actually put into the building, means economy and comfort and added satisfaction during the years he occupies his home.

THE HOUSE INDESTRUCTIBLE



A STEP that brings the average home-builder nearer his fondest dream of a "house that will not burn or decay" has just been taken at Youngstown, Ohio. This active center of the great steel district, extending from Pittsburgh to Lake Erie's shore, has developed a steel and concrete house, at a price well within the means of the modest home owner and rivaling in first cost the ordinary frame house.

The residence was built as an experiment by the General Fireproofing Company, of Youngstown. The purpose was to standardize this type of construction and arrive at actual costs. Structurally it is composed exclusively of fire-resistive materials, and the only wood used is for minor trim, doors and windows. The wood is fastened with screws, and fireproof doors, windows and trim could be substituted if the owner aimed to entirely eliminate inflammable material.

The accompanying cut tells its own story of exterior appearance. It is the belief of the designer that the fireproof house should be distinctive and that it should not attempt to reproduce the type commonly constructed in wood. The expression of this idea is most pronounced in the roof, which, like all other portions of the house, is of steel and concrete, and is nearly flat.

At first thought the old power of habit may exert itself against the flat roof, but why should not the house covering be flat? It is in perfect harmony with the general lines of the house, and the general adop-

tion of such a type needs only a little independence on the part of the builder. Let the man who can tell why the roof of a house should not be flat tell us also why he has two perfectly useless buttons on each of his coatsleeves.

Let it be known at once that the cost of this six-room house, complete in every detail, will range from \$4,200 to \$4,500, according to location and attending markets of material and labor. The cost in substantial frame construction would not be much less.

A Cleveland contractor who figured these plans offered to duplicate the house in that city for \$4,200.

Here is how the fireproof house was built:

Basement.—Foundations of 9-inch solid concrete, resting on concrete footings. From grade line to first floor there is an 8-inch brick wall. The basement floor is built of 4 inches of cinders, 4 inches of concrete and 1-inch cement finish. Walls and floor are water-proofed.

Frame.—The structural steel frame is much like that used in the big modern skyscrapers, except that it is lighter, of course. Columns supporting floor are embedded in concrete, making it permanent and eliminating settling or vibration. There will be no uneven floors or cracked walls in this house.

Roof.—This portion of the structure offers one of the real problems of the enterprise. The builders used reinforcing expanded metal with concrete and

waterproofing. The under side is plastered with cement mortar to a thickness of 1 inch.

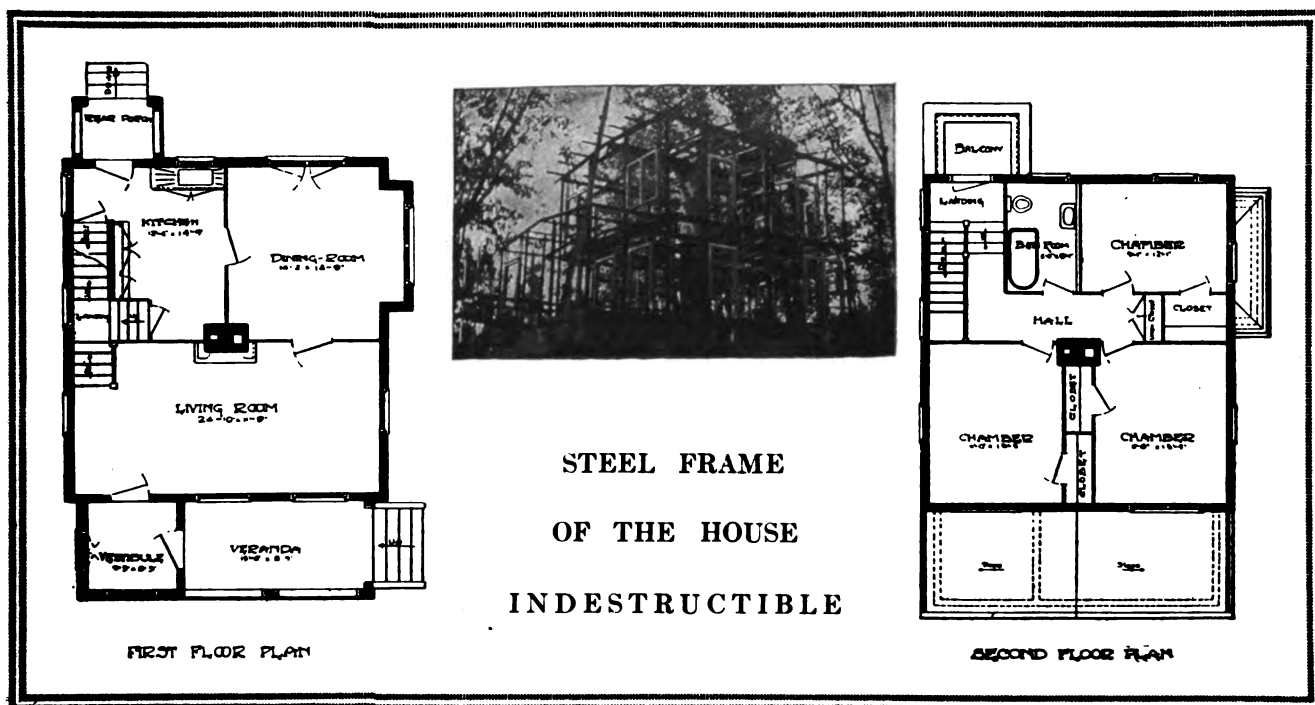
Side Walls.—The outside wall is made by wiring metal lath on the steel structure and plastering on both sides. The outside is finished with scratch coat and plaster, two coats, waterproofed. The inside wall is plastered on expanded metal, wired to the steel frame and plastered one side only. This construction leaves the air space essential to cold, heat and moisture proofness.

Floors.—Two and one-half inches of concrete on expanded metal, which is laid over "I" beams and fastened thereto, form the floors. Over the concrete composition flooring is used, and this is fire-resisting and sanitary. The composition is carried up the side

Stairways.—Consistent fireproofing is accomplished in the construction of stairways, which are completely closed off to separate one floor from the other. Only fire-resisting materials are used in the stairs, being entirely of steel and concrete.

The plumbing and wiring are as easily installed in this type of house as in the wooden kind, and the heating pipes are carried to the second floor in a duct beside the chimney, and are encased in metal lath and plaster.

A reading of the specifications of this house will suggest to all the economy of maintaining it. There is practically nothing to burn, decay or get out of repair. In the average, clean residence neighborhood painting would be unnecessary. If subjected to much smoke, it might be necessary to give the exterior a



wall to form the baseboard with absolute vermin-proofness. It is possible to "turn on the hose" in this house for a thorough cleansing. The composition floor may be varied in color to suit decorating scheme of the room.

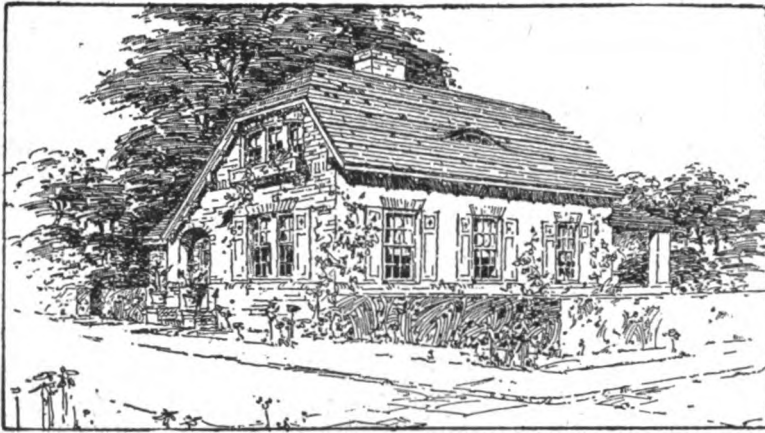
Ceilings.—Ceilings are of metal lath and cement plaster, the metal being fastened to underside of beams. The plaster is five-eighths of an inch in thickness.

Partitions.—Reinforced concrete partitions are used through the house. The reinforcing is fastened top and bottom, with an angle at the joint giving the finished job the appearance of having a moulding or corner strip. The partitions are 2 inches in thickness, effecting a considerable saving of interior space. All inside walls are finished with sand coat and tinted. No wall paper is used in the decorating of this house.

coat of cement paint once in four or five years, but paint will not be necessary for preservation of the material, as is the case with wood.

This type of construction lends itself to many designs in building. The manufacturers of the metal structure and of metal lath are endeavoring to perfect a method of facing this type of building with brick.

The majority of people are absolutely ignorant to the fire danger of frame construction and do not understand the differences between the cost of building a structure of brick and of lumber. They know very little about the increase to property values brought about through this construction, nor the economy in the upkeep of such a building. The people should know these facts. They should be taught these lessons.



No. 1104

S-A-F-E BUNGALOW FOR \$3,000

TWO years ago the clay products manufacturers of the country set out to make a demonstration of the economy of the use of their product in home building. They initiated a competition in which more than eight hundred plans were submitted by architects from all parts of the country.

The little home shown in the accompanying cut was selected from among all these as being the best suited to the general needs of the average small family. It is of the compromise bungalow type, with one chamber on the ground floor, and two chambers, bath and storage on the second floor.

An explicit condition was that the house was not to cost more than \$3,000. It was built at the Clay Products Exposition in Chicago for that figure.

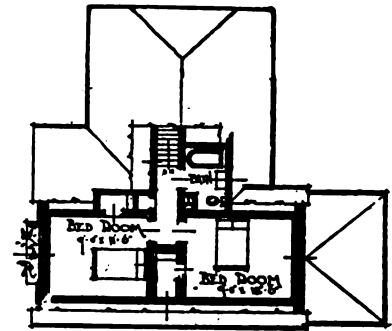
Within the past month, the Society Advocating Fire Elimination obtained bids upon it from three contractors, each bidding independently of the others. All turned in bids of \$3,000 or a few dollars under. For plumbing, hot-air heating system, electric wiring and fixtures, gas piping, grading, sidewalks and all interior fittings, even to window shades—in fact complete and ready to move into—from six to seven hundred dollars will need to be added.

This means that this little home may be erected anywhere in Cleveland or its suburbs for from \$3,600 to \$3,700, without adding a cent to this price to make the home complete.

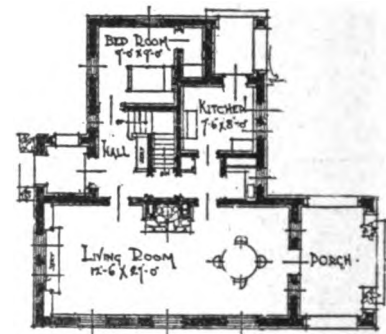
These bids were submitted for the erection of the house of hollow tiles, faced with face brick to cost \$14.00 per thousand. In cities where hollow tile is difficult to obtain, common brick may be substituted without any noticeable change in cost. The roof is to be covered with fire-resistant asphalt shingles.

The distinctive appearance of this little home makes it suitable to place on any lot, no matter how pretentious its neighbors. It will provide a home on which upkeep will be practically eliminated, that will be easily heated, and will provide a lifetime home for the average family.

The Society Advocating Fire Elimination has obtained a supply of plans and specifications of this home, which may be had free of cost by applying to its Secretary, at 356 Leader-News Building, Cleveland.



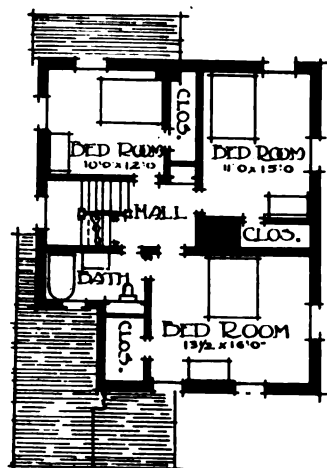
Upper floor



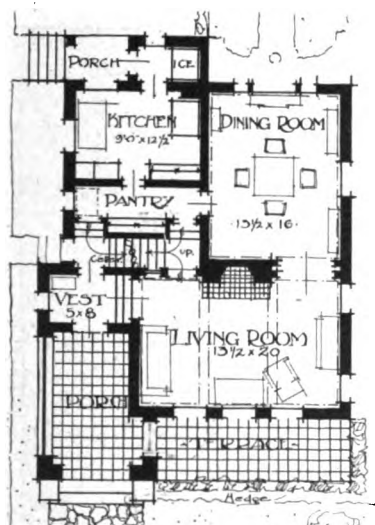
Ground floor

Several years ago it was stated on the authority of the National Board of Fire Underwriters that at least 27 per cent of the country's fire loss comes from fires that extend beyond the buildings in which they originate, these losses being undoubtedly due to the inflammable construction of our buildings. When you add to this amount \$315,000,000 paid in insurance premiums you begin to realize what a tremendous amount is given each year to the Goddess of the Flames.

To anyone engaged in the trade it is a well-known fact that while you find many carpenters constantly drawing plans, laying out buildings, providing specifications, etc., for frame construction, you find very few safe material contractors doing this kind of work. Instead of going to a prospective builder and showing him the value of safe construction, providing him with figures, plans, etc., he is content to lay the foundation or put in the fireplace and let it go at that.



Second floor



First floor



No. 1107

A LOW-PRICE STUCCO HOUSE

THE plain white surfaces of this house are well adapted to the use of metal lath and stucco over wood frame-work. This type of construction, when the lath is back-plastered between the studing, is durable and beautiful. It provides a solid slab

the inner metal lathing and plastering, affords insulation against the elements—both heat and cold. Thus constructed, and with red or green asphalt shingles or slate, with window sashes to match, it will make a beautiful home.

Its contract cost is \$4,000, according to the architects, The John Henry Newson Company.

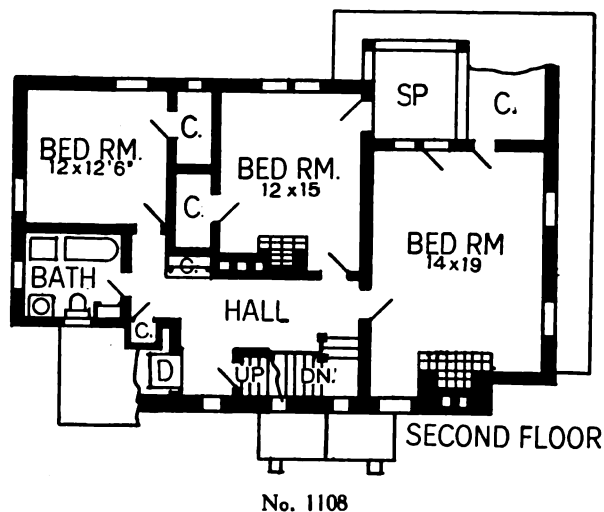
The large living room across the front is exceedingly well lighted and has a broad open fireplace that will take a large log. The combination stairs lead to the second story from the living room and from the pantry. The kitchen is well arranged and contains cold room for the ice box. There is a basement under the entire house and a storage attic, which might be finished at small expense.

Reinforced Concrete

(Continued from page 108)

The floors of this building are pitched 2" in the width of the building and scuppers placed along the lower side to carry away any water that may be released either by discharge of sprinklers for the extinguishing of fire or accidental discharge. This building is of absolutely fireproof construction. No wood will be exposed in any portion of the structure. Steel sash with wire glass is used throughout, and the doors are fireproof. Even the roof and roofing is so constructed that not even a wood nailing strip is required for eave cleat or flashing. The elevator and stairs are encased in reinforced concrete walls and all openings protected by automatic fire doors. All electric wiring is in metal conduit, secured to the forms before the concrete is cast, so that nothing is exposed but the outlet boxes.

Reinforced concrete is beyond a doubt a most excellent building material for factory construction, but the plain evidence of the various fires which have taken place in the various buildings of this type proves conclusively that consistent construction is absolutely necessary. Floors, walls, roofs, girders, beams and columns of properly reinforced concrete constitute the basis of an ideally firesafe building, but the use of this excellent material must be accompanied by metal window frames, wire glass, automatic fire doors, proper alarm systems, and, for the protection of contents and the extinguishing of incipient fires, sprinkler systems should be installed. There is only one possible use for wood in a building of this type, and that is for floor covering, but even for this purpose there are to-day many types of fire-resistive flooring which have all the good qualities and offer safety and long-wearing features which cannot be overlooked.

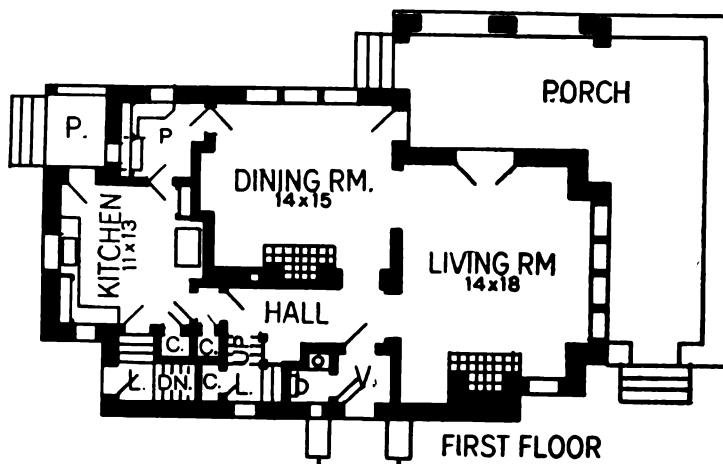


AN ENGLISH RESIDENCE

FOR those who desire a rather pretentious residence of distinctive design, that shown in the accompanying illustration offers a suggestion. It embodies many features borrowed from English architecture, in its high gables, its plain front with interesting grouping of windows, its porch facing the garden, and its broad terrace. It offers excellent opportunities for the brick mason to display his art.

The many and exceptional good features of its interior design are made clear in the plans. Among these are the accessibility of the porch from both the living and dining rooms, the well-planned kitchen and pantry, the downstairs lavatory and the numerous closets. Upstairs the three rooms are all large and have plenty of windows, insuring good ventilation. The sleeping porch is an added good feature. The third floor is full height and provides ample room for service accommodations.

The specifications of this house call for the use of hollow tile, to be faced with a warm-red brick of



rough texture. The roof is of green slate or tile. The exterior woodwork is to be painted brown and the window sashes white for contrast.

Unless many expensive extras are demanded, this home may be built for about \$7,000. It was designed by the John Henry Newson Company, Cleveland.

Lumber Advanced 100 per cent

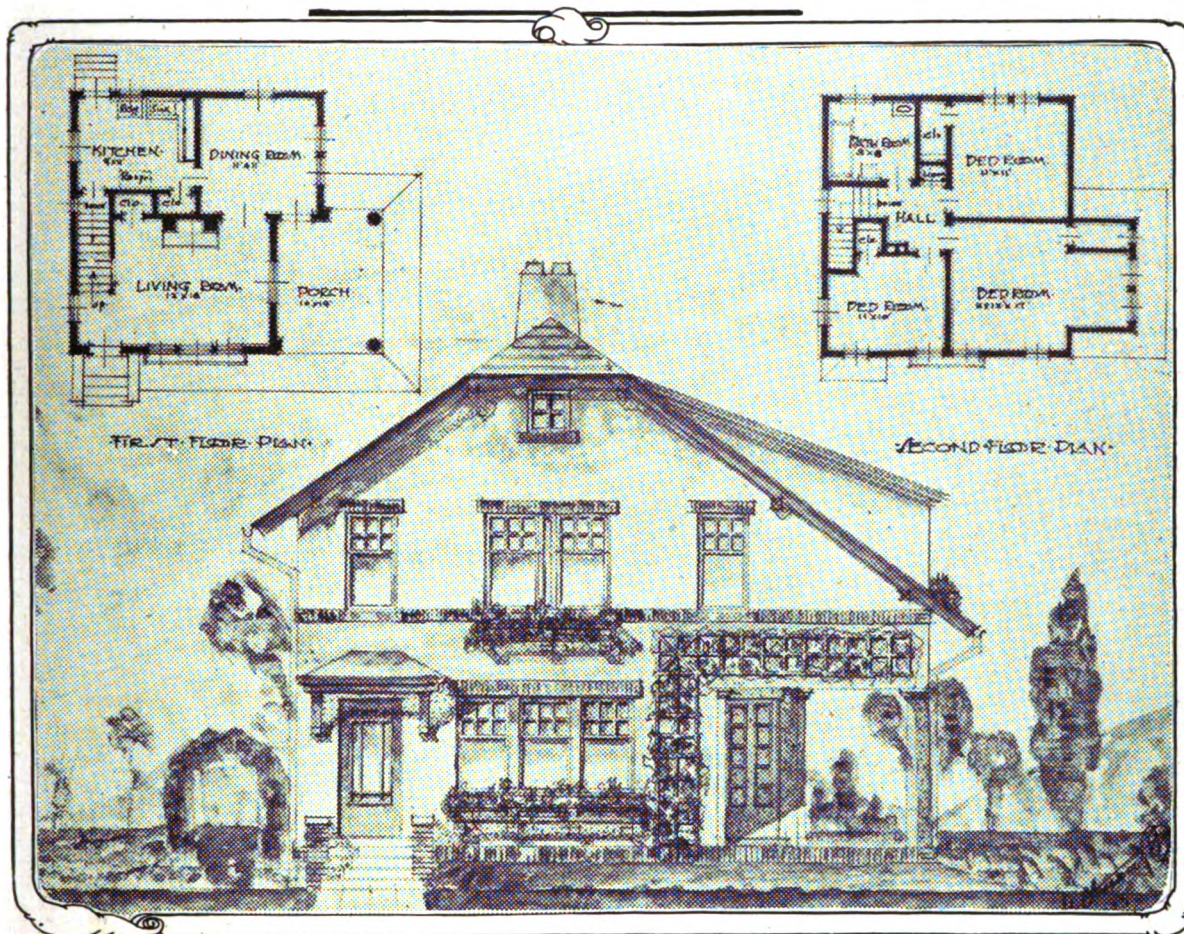
One of the many factors accounting for the rapid trend toward the use of fire-resisting materials is the steady increase in the price of lumber of nearly all kinds.

An example is found in a recent number of the *AMERICAN LUMBERMAN*, the official organ of the lumber industry in this country. A company operating in Barnesville, Ohio, recently came into possession of one of its bills rendered for lumber in 1895. Prices of the

same stock in August of this year were compared, with the following result:

	Aug. 9, 1895.	Aug. 9, 1915.
50 pcs. 2 x 10-20 hem.....	\$10.00	\$23.00
25 pcs. 2 x 12-20 hem.....	10.00	28.00
50 pcs. 2 x 8-20 hem.....	10.00	28.00
50 pcs. 2 x 6-20 hem.....	10.00	22.50
100 pcs. 2 x 4-10 hem.....	10.00	21.00
150 pcs. 1 x 12-16 hem.....	10.25	24.50
100 pcs. 1 x 10-16 hem.....	10.25	28.50
25 pcs. 2 x 10-16 hem.....	10.00	21.50
75 pcs. 2 x 8-16 hem.....	10.00	21.50
75 pcs. 2 x 6-16 hem.....	10.00	21.50

It will be seen the advance in price is in every case more than 100 per cent, and reaches on some items 130 per cent over that obtaining twenty years ago.



No. 1103

A HOME OF PLEASING DESIGN

THERE has come a revulsion of feeling against the "allotment" house. The presence of street after street of houses, which differ from their neighbors only in the color of their paint, has resulted in a monotony that is fast "getting on the nerves" of home owners.

Realizing this, some progressive architects are turning their efforts to the design of small houses that are "different." To accomplish this and still keep costs down is a study worthy of the best architects. Many have succeeded admirably.

The little home shown, by F. Stillman Fish, a Cleveland architect, is one in which advanced ideas in small residence design have been well worked out. It is of distinctive appearance and would grace any street on which it might be placed. The recessed porch, which may be screened or glassed in, is a feature seldom met with in houses costing less than \$7,500. The windows

of the downstairs rooms are unobstructed, which insures an abundance of light.

The upstairs contains three good-sized chambers and an ample bath. There are plenty of closets. A drop stairs leads into the attic, which provides storage for trunks, etc.

The contract price of this house is \$3,000 in Cleveland, complete and ready to move into.

Built of hollow tiles, covered with cream-white stucco, trimmed with red brick and with a red roof of fire-resistive materials, it provides a home that is far removed from the average of allotment houses. It will provide an excellent investment for rental, as it has so many features not found in the average small house that its owner never will be at a loss for tenants.

As a home it will need few repairs, and will be readily salable or can be easily rented at any time.

STANDARD FIREPROOFING PRODUCTS.

REYNOLDS



SHINGLES

TESTED by the Underwriters laboratories under their standard tests, Reynolds Shingles have proven themselves worthy of classification as fire preventatives.

Reynolds Shingles have a top surfacing of granulated slate, granite, etc., and they positively will not ignite from flying sparks or brands. Where fire originates inside the building they have a marked blanketing influence.

We call them "Safety First" because they protect from rain or storms, from heat or cold and from the common agencies which spread fire.

Reynolds Shingles are the standard asphalt Shingles and you will make no mistake in insisting on Reynolds Shingles.

If your dealer cannot supply you write the factory.



E. M. Reynolds Asphalt Shingle Co.
"Originators of the Asphalt Shingle"
Grand Rapids MICHIGAN

No Home Complete Without Brick

Regardless of the type of house there must be some brick on the job.

Not to have these brick just when you want them, and of uniform good quality means loss to you.

It's our business to take care of this service, in a way that will be satisfactory to you.

The Farr Brick Co.
Leader-News Bldg., Cleveland

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Our Beach Grove Allotment on Lake Shore Boulevard has been selected as the site for the modern Fire-Safe Home to be erected this fall by the Society Advocating Fire Elimination.

Cleveland's Lake Shore property is scarce and grows steadily in value.

Our allotments have been located in this section for that reason.

You will be safe in placing your Real Estate wants of any kind in our hands.



GENERAL REAL ESTATE

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CLEVELAND, OHIO

BRANCHES:

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For a Fire-Resistive WEATHER PROOF PORCH FLOOR

USE



LAI'D ON OLD RAILROAD IRON
4 FT. ON CENTRES

Concreted to the desired thickness.
It's concrete without the expense of
Forms or Stiffening Channels.

Send for
Data Sheet, 32 c.
Giving Table of Live Loads

You will Save Money both in First Cost
and in Upkeep.

The Bostwick Steel Lath Company
NILES, OHIO

STANDARD FIREPROOFING PRODUCTS.

Boosts your credit when you call on the banker

When you seek a loan from a bank or from anyone else, you've got to show how you stand, and outside of actual real-estate or personal property, there's nothing that more surely stamps you as a citizen worthy of credit than the fact that you carry life insurance.

Policies of insurance mean that money is in the till if anything happens, that you are thoughtful and prudent, and that you practice self-denial in order to protect those depending on you, and those you may owe.

Carrying insurance means also that you are a good *moral* risk, the kind that even hard-headed bankers will take a long chance on.

The late J. P. MORGAN said:

"Commercial credits are based upon character before anything else."

The HON. A. BARTON HEPBURN, of the Chase

National Bank, and also connected with many leading institutions, said:

"Now, if a business man is known not to have a life insurance policy, it excites the query, 'I wonder why?' The quality of mind which induces one to take out life insurance is the quality of mind that best insures success in business."

So carry all the insurance you prudently can, and when it comes to that, you want to get the most and best for your money. You want sound protection at low net cost and you

should therefore turn to the institution that supplies it —

Postal Life Insurance Company

The Postal employs no agents, thus making important savings for its policyholders, as shown in the mail bag. It issues all the standard policy-forms approved by the strict New York State Insurance Department, under whose supervision the Company operates, as well as being subject to that of United States Postal authorities.

Find Out What You Can Save

Mail the coupon today or copy the same in a letter, and get exact figures for your age on any form of Policy — Whole Life, Limited-Payment Life, Endowment or a Monthly Income Contract.

Sending for information places you under no obligation and no agent will be sent to visit you; the Postal does not employ agents, the resultant commission-savings going to you because you deal direct.

Postal Life
Insurance Company
35 Nassau St., N. Y.

Without obligating me, please send full insurance particulars for my age.

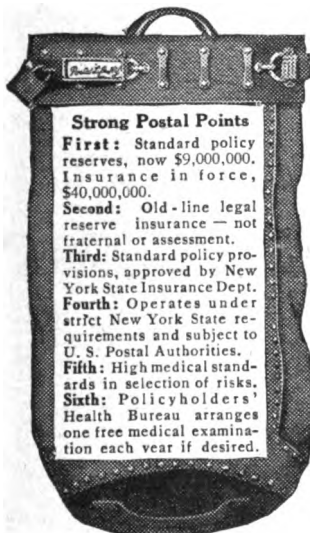
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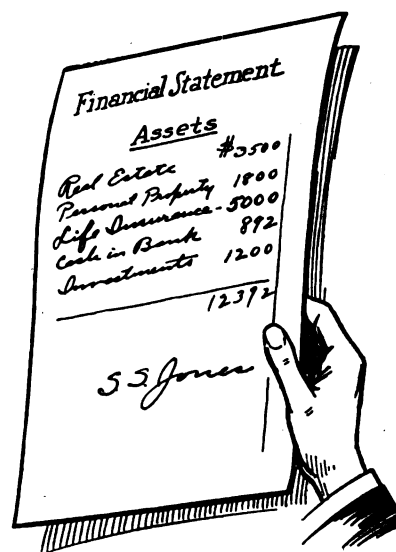
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POSTAL LIFE INSURANCE COMPANY

WM. R. MALONE, PRESIDENT
THIRTY-FIVE NASSAU STREET, NEW YORK



STANDARD FIREPROOFING PRODUCTS.

INDESTRUCTIBLE
CONCRETE CONSTRUCTION
WITHOUT FORMS!

HOUSES, Garages, Stables,
Bungalows, of **POURED**
CONCRETE at the cost of wood.

To Builders

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Concrete Construction are offered
on royalty basis.

"Unburnable Buildings at the Cost of Wood"



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Times Building New York City

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AND
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AND
WALL BLOCKS

Telephone: Murray Hill 7788-7789

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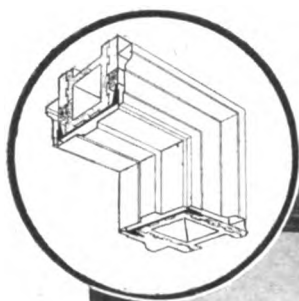
OF NEW YORK

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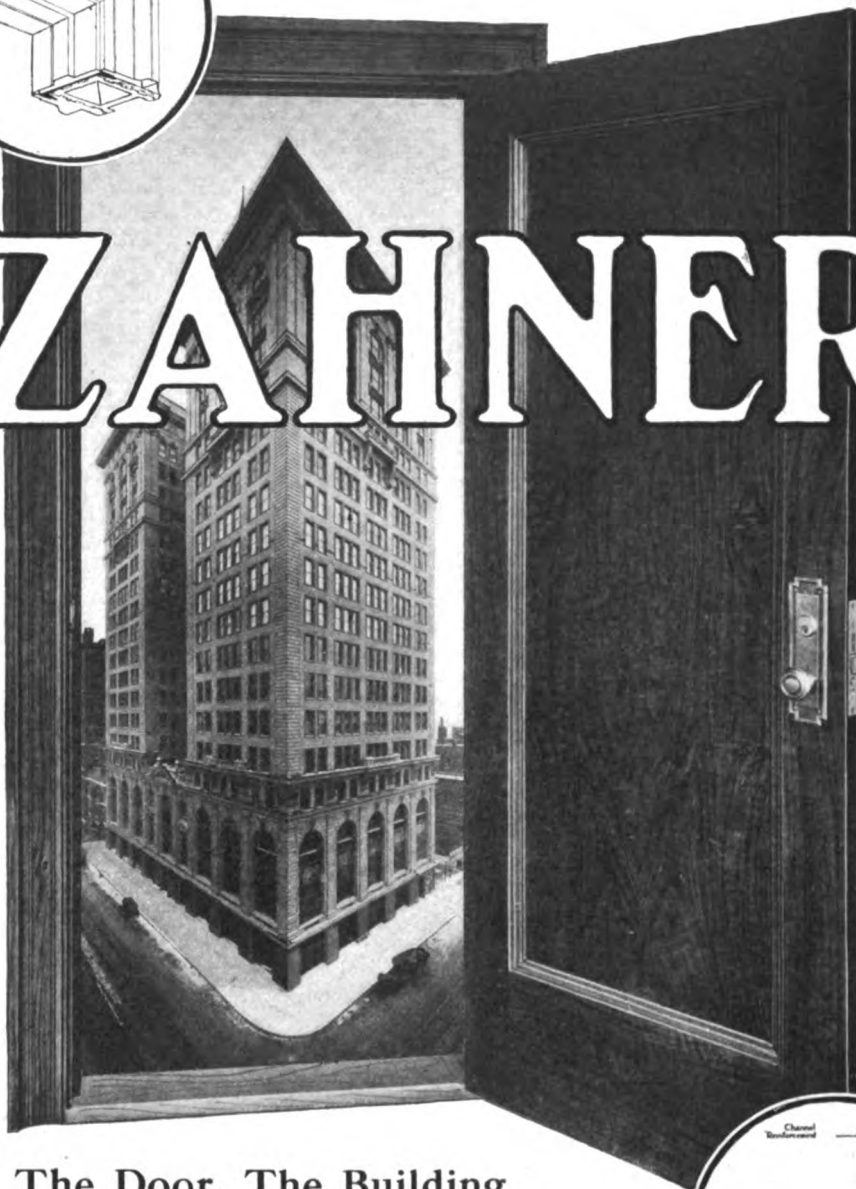
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*First Nat'l Bank—Soo Line Bldg.
R. W. Gibson, Architect
Thompson-Starrett Co., Contractor*

ZAHNER

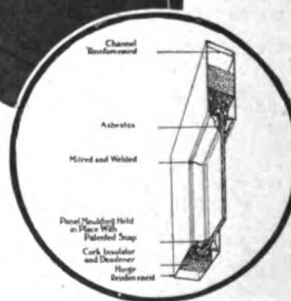


The Door, The Building And The Reason Why

This composite picture illustrates the supremacy of ZAHNER Hollow Steel Fire Resisting Doors.

ZAHNER doors were specified because they have no bolts, screws, or rivets in their construction, and possess style and finish that makes them indistinguishable from wood.

These are also excellent reasons why YOU should specify our doors.
Write for sample of construction and finish.



New York Office
42nd Street Building

THE TECHNICAL FIRESAFE BUILDING PUBLICATION

"It costs less to prevent fires than to pay losses"

OFFICIAL JOURNAL OF SOCIETY ADVOCATING FIRE ELIMINATION

CONSTRUCTION

WITH A
DEPARTMENT DEVOTED TO
SAFE HOMES

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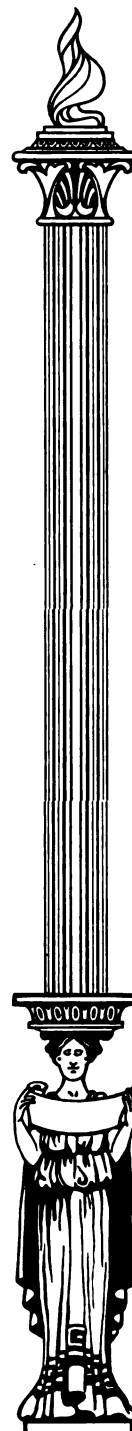
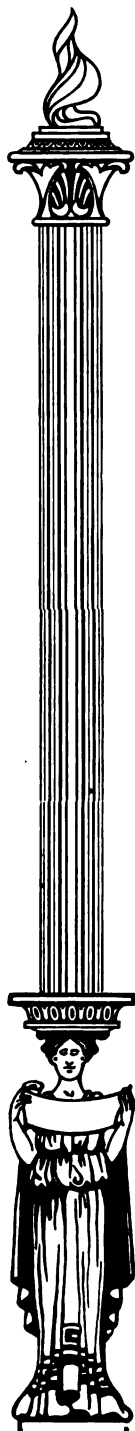
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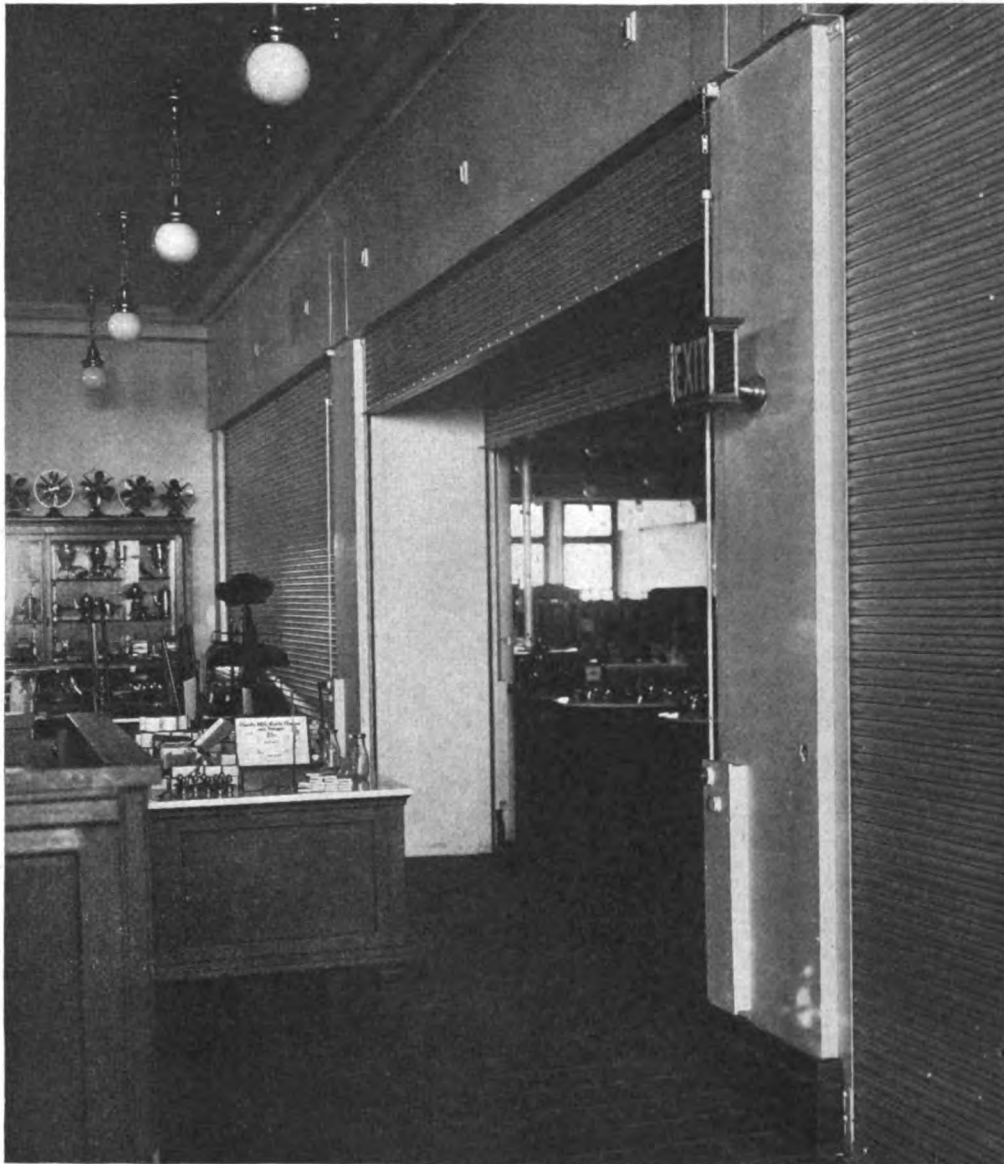
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One of the Automatic Closing Types of
STEEL ROLLING FIRE SHUTTERS

Manufactured by

THE KINNEAR MFG. CO.

Columbus, Ohio

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THE WORLD'S LARGEST OFFICE BUILDING

ABSOLUTELY FIREPROOF



EQUITABLE BUILDING

ERNEST R. GRAHAM, Architect

NEW YORK

THOMPSON-STARRETT CO., Builders

TO GIVE THE GREATEST POSSIBLE PROTECTION TO TENANTS AND TO SECURE THE LOWEST POSSIBLE INSURANCE RATE, THE OWNERS OF THIS BUILDING INSISTED THAT IT SHOULD BE ABSOLUTELY FIREPROOF AND BUILT OF THE MOST APPROVED MATERIALS. NATURALLY THIS CALLED FOR METAL DOORS AND TRIM THROUGHOUT. THE BUILDING CONTAINS 9025 DOORS, 500,000 FEET OF BASE MOULDING, AND 465,000 FEET OF PICTURE MOULDING. ALL DOORS ARE HUNG TO OUR PATENTED STEEL BUCK. THIS ENTIRE ORDER WAS MADE AND INSTALLED BY

EMPIRE ART METAL CO., John W. Rapp President **College Point, N.Y.**

THE TECHNICAL FIRESAFE BUILDING PUBLICATION

"It costs less to prevent fires than to pay losses"

What Service Can a National Publication Render Fireproofing Interests?

A Consideration of CONSTRUCTION From the Self-Interest Viewpoint of the Manufacturer

Consistent fireproofing requires the use of a variety of standard building materials, equipment and devices, manufactured by a number of concerns in different industries.

Concrete, structural steel, brick, terra cotta, hollow tile, etc., have from one to several journals to represent them. These publications are the mouthpieces of the trade each exists for.

The Concrete papers are produced to emphasize concrete and say as little as they can about the virtues of any other material; in fact, they are rather inclined to doubt that any material aside from concrete has the quality of being fireproof—at least to the extent which they claim for concrete—and manifest an inclination to disparage the use of anything other than that material which they advocate.

The brick journals are out to shout for brick, and make a loud silence for concrete.

And so it is with the papers advocating terra cotta, stone, etc. Each is in the strictest sense a “class” publication.

This condition is entirely just and proper; for these magazines are produced to represent *an* industry. They derive their support from the manufacturers constituting that industry, to give publicity to their product. It is quite normal and logical that they should bespeak the proven excellencies of the business which they are established to promote and from which

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they receive the means of sustenance. These class publications are doing their appointed work and doing it well. CONSTRUCTION entertains the warmest appreciation for the merit of their service to the business each represents, and between them and CONSTRUCTION there is right good will; *for while each of them is the mouthpiece of one industry, CONSTRUCTION is a national publication produced to advocate a type of construction—consistent firesafe building—which calls for the use of all standard building materials and protective devices; for the propaganda of correct fireproofing embodies the use of the products of a dozen or more industries.*

Right here is where CONSTRUCTION renders its greatest service to the fireproofing interests: it is published to prove and promote the economy, safety and efficiency of that type of firesafe building which it advocates; not to emphasize any particular material—many journals efficiently perform that worthy task—but to explain the application and the service of all materials and devices necessary in the erection of buildings which cannot burn.

In the furtherance of such a propaganda, the promotion of which must result to the mutual advantage of manufacturers and this enterprise, CONSTRUCTION has a clear field; for while other mediums occasionally emphasize general fireproof construction, rather than the particular material they feature, CONSTRUCTION is the only journal in the country devoted exclusively to the advocacy of the various types of consistent firesafe building.

The manufacturers of fireproof materials constitute the only aggregation of interests in the United States which had no national publication to represent them prior to the advent of CONSTRUCTION; and as an instrument which shall bring into closer and more vital association the members of many affiliated industries, CONSTRUCTION will render a most worthy service to the fireproofing interests—for anything which results in greater cooperation between various factors having a common purpose must lead to a truer conception of the immense possibilities for broader development of the fireproofing field and open up to their vision the vast prospect of more business and greater service which results when men with a common objective band together. It is the strength of intelligent team work as against individual effort. It is the "get-together" idea which is prevalent throughout the country and has been responsible for the most inspiring successes ever achieved.

The sound logic of the argument for consistent firesafe building is unanswerable, and any utterance favoring the use of combustible building material as against that of non-combustible substance or manufacture cannot face the light of truth or withstand the revelation of proper test. In the consistent fireproof structure, be it cottage, factory or skyscraper, the world has the very best in building construction; and the interests related to this type of construction know they offer that which has no superior.

STANDARD FIREPROOFING PRODUCTS.

The fireproofing interests are now a number of separate units all having one common purpose. Why should they not organize into one fraternity? What more logical avenue of practical service to them, to the business and professional classes controlling worth-while building contracts, and to the general public, than a national publication capable of acting as their representative and explaining through nation-wide publicity the superior structural, protective and economical excellencies of consistent fireproofing?

In promoting such a field CONSTRUCTION can be of broader service and greater practical usefulness than any other publication, for the reason that it is not obligated to any special interest, but is free to serve many in accomplishing a work which is needed in every city, township and hamlet throughout the United States.

CONSTRUCTION, in bringing the fireproofing interests into cooperative association, will have rendered a meritorious service of the soundest value; yet even that would be the achievement of but half its purpose—the “intensive” side.

Extensively the publication has as its aim the promotion of the consistent firesafe building idea before all the prominent classes related to construction work, and with this service in view the magazine is sent each month to none other than the leading architects, engineers, contractors; municipal and federal building officials, chambers of commerce, boards of trade, civic organizations, real estate boards, and other bodies actively working out the building problems of their cities and communities; banks, trust and insurance companies making a specialty of building loans; building owners, and other associations and individuals whose business or profession requires that they be informed regarding fireproofing.

The architect must be convinced that he can plan any type of structure along consistent firesafe lines and still incorporate whatever elements of beauty and harmony he desires.

The engineer must be shown that in planning proper fireproof buildings, he is giving his client the greatest possible safety, for which he will eventually receive full credit.

The contractor must be led to a knowledge of what constitutes consistent fireproofing.

Municipal and federal building officials need to be informed in the fight for better codes and legislation which shall result in extended fire limits and call for the elimination of glaring inconsistencies in so-called “fireproof” buildings.

The building owner must be convinced that in deciding for real fireproofing he has elected to build that which will ultimately cost him far less than any other type of construction, and which will give him the greatest

STANDARD FIREPROOFING PRODUCTS.

satisfaction in maximum income, minimum expense, and freedom from any fear of ever finding his property a partial or total ashheap.

All need to be educated regarding the proper use of standard fireproofing building materials and devices.

These are some of the functions of the publication which aims to give broad national publicity to the type of building construction which calls for the use of *your* product. No other journal is working so directly to advance, where it is most needed, that knowledge which must make for an increasingly greater percentage of buildings constructed on consistent firesafe principles.

You know the need amongst the fireproofing fraternity for such a work as CONSTRUCTION is promoting—which is not so much the idea of establishing a publishing business as it is a part of the fireproofing business—a clearing house for all that is really helpful to the field it serves.

You have a conception of the widespread good such a magazine can accomplish for the classes which constitute your buying public.

In the October and November numbers you have had an opportunity of analyzing the publication and judging its merits—of knowing whether or not it appears worthy to represent your interests. You have perhaps observed that CONSTRUCTION is not filled with re-written or copied matter, but that it is a serious effort to serve a definite field, replete with material of genuine usefulness, practically full of original articles all planned with the one idea of *service* to our readers. Not a few whose judgments are valued expressed agreeable surprise on receiving the initial (October) number. The general opinion was that CONSTRUCTION bore an unusually well established appearance. The November number was easily a marked improvement over the preceding month. Now you have CONSTRUCTION for December, better by far than the others, yet you can justly take pride in any one of the issues.

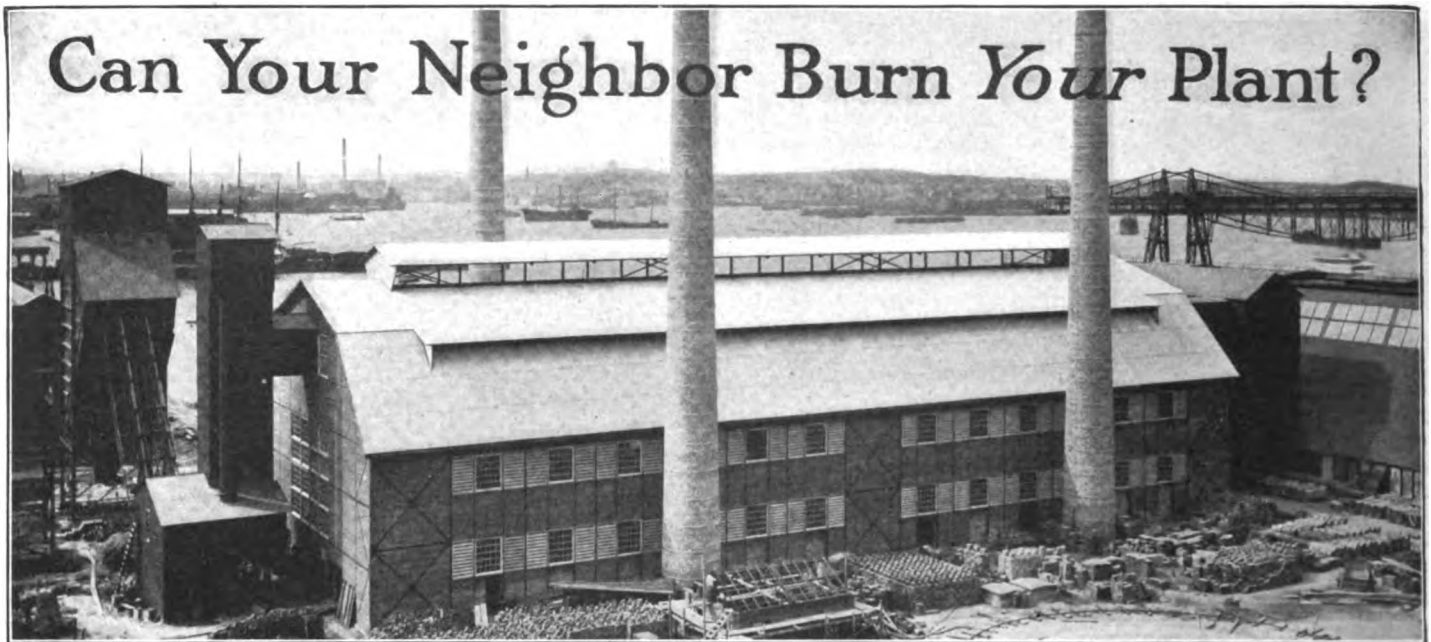
From the viewpoint of your own self-interest would it not be sound business judgment to include CONSTRUCTION in your 1916 advertising schedule?



Publicity Manager.

December, 1915.

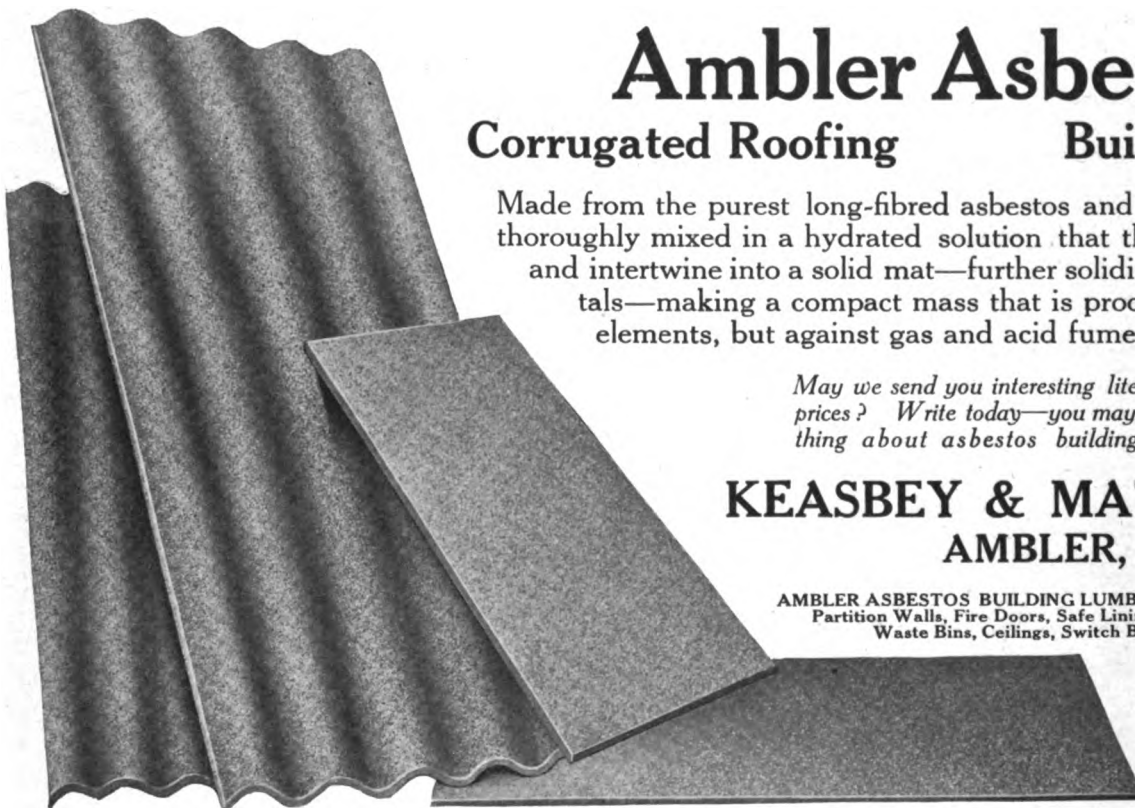
STANDARD FIREPROOFING PRODUCTS.



CAN flying sparks or burning brands from fire in an adjoining plant set *your* roof in flames—or will heat radiating from nearby fire damage your building or equipment?

Can the scorching summer sun—the tight freezes of severe winters—the sharp fall winds—the heavy spring rains—heavy falls of snow—can these things injure your roof? Does your roof show signs of wear and deterioration from year to year? Are you digging into your profits to pay paint bills—repair bills and perhaps even an occasional re-roofing?

Stop the drain now with a roof and siding that is practically indestructible—absolutely FIREPROOF and NON-BURNING—WEATHER—WEAR and EXPENSE PROOF.



Ambler Asbestos

Corrugated Roofing

Building Lumber

Made from the purest long-fibred asbestos and Portland cement—so thoroughly mixed in a hydrated solution that the asbestos fibres lace and intertwine into a solid mat—further solidified with cement crystals—making a compact mass that is proof against not only the elements, but against gas and acid fumes as well.

May we send you interesting literature—samples and prices? Write today—you may need to know something about asbestos building material sometime.

KEASBEY & MATTISON CO.
AMBLER, PA.

AMBLER ASBESTOS BUILDING LUMBER used for Elevators, Stairways, Partition Walls, Fire Doors, Safe Lining, Store Rooms, Wainscoting, Waste Bins, Ceilings, Switch Boxes, Closets, Walls, etc.

AMBLER ASBESTOS
 CORRUGATED ROOFING
 AND SIDING

Roofing, Siding, Garages, Out Buildings, Stairways, Storage Rooms, Fire Walls, Etc.

THE TECHNICAL FIRESAFE BUILDING PUBLICATION
"It costs less to prevent fires than to pay losses"

there is weakness. The question is—just what is this weakness, and how can it be overcome?

The wise manufacturer believes in good machinery. He knows that he can get it by going to good machine makers whose plants are best equipped for the purpose of producing good machinery; in other words, he appreciates that superior producing conditions mean exceptional results. Why, then, should not this same fact apply to the selection of men? If their environment is improved, will they not be better men? The better class of our citizens live in better class homes. Inversely, better homes will give us superior workmen.

Unfortunately, our cities are not in many cases equipped with model homes for the working classes, therefore our manufacturers have no such places from which to draw healthy, contented men. This problem once realized, good business sense seeks its solution, and seeking, will find that properly planned and constructed industrial communities afford not only the solution but actually good financial investments, where money expended returns in a comparatively short time, with interest, and the added value of a high-grade working force immune from labor troubles and discontent. This is the true foundation of *esprit de corps*—to so house the workers that their home life may instil into their minds that sense of contentment, satisfaction and security which tends to insure proper working capacity.

A careful analysis of the home conditions of the working classes and the influence of such conditions on the minds and bodies of the workmen, and consequently on the work produced, will prove invaluable to the manufacturer who is progressive and believes in getting the full quota of results from the money he pays out for labor.

In England, across the river Mersey from Liverpool, lies the model village of Port Sunlight, the industrial town of the employees of the great soap works of Lever Brothers. This village houses about 3,000 persons and cost over two and one-half millions of dollars. The soap company not only receives no direct return on this investment, but is satisfied to lose \$120,000 a year in keeping up the village. Sir William Lever makes excellent comment on the relation between efficiency and living conditions when he says that business cannot be carried on by physically deficient employees any more than war can be successfully waged by physically deficient soldiers.

Frederic C. Howe, in "Scribner's Magazine" of July, 1912, gives some exceedingly interesting statistics showing clearly the benefit of proper living conditions. We quote:

"The height of Port Sunlight school children at 14 years of age was 62.2 inches, while those of the public schools of Liverpool range from 55.2 to 61.7. The weight of the same children was 108 pounds in Port Sunlight and from 71.1 to 94.5 in the public schools.

The statistics of the death rate are quite as remarkable. In the average industrial cities of England it ranges from 14 to 19 per 1,000; while in Port Sunlight it ranged during 7 years from 5.55 to 12.87 per 1,000.

"Port Sunlight is not an exception. The comparison between Bournville (another proprietary garden city) and the nearby city of Birmingham is as follows:

Death rate in Bournville for 6 years, 7.5 per 1,000

Death rate in Birmingham for 6 years, 17.9 per 1,000

Infant mortality in Bournville for 6 years, 78.8 per 1,000

Infant mortality in Birmingham for 6 years, 170.00 per 1,000

Average height of Bournville boy of 11 years, 4 feet 9 inches

Average height of Birmingham slum boy of 11 years, 4 feet 2 inches

Average weight of Bournville boy of 11 years, 4 stone 13 pounds

Average weight of Birmingham slum boy of 11 years, 3 stone 11 pounds

Greater chest measurement of Bournville boy over Birmingham boy, 3 inches.

"The comparison of Letchworth, a garden community which claims to be the healthiest city in England, with other cities of that country in respect to the infant mortality rate is as follows:

City	Infantile Mortality Rate per 1,000 Births	Ordinary Death Rate per 1,000
London	107.9	14.0
Birmingham	134.3	15.4
Manchester	134.0	17.9
Liverpool	143.6	19.0
Middlesborough	157.8	19.1
Letchworth	31.7	5.2

Thus, as the above figures show, the idea of community building has given splendid results in England. It has proven of distinct value to the owners of great factories; and likewise it must prove of value in America.

Everywhere throughout this country manufacturing conditions show plainly a great need for such improvement. For the larger plants entire villages should be built; smaller concerns can easily combine to build model towns from which they can each draw labor.

Bent on a careful investigation of this subject, one enters a great manufacturing plant. Here the first step has been taken by the introduction of proper manufacturing conditions. There is light and air in abundance. The factory buildings have been designed by a good architect. From the windows the view is not unpleasant. The hum of industry is in the air—one senses the fact that it is good to work here! Here is better production than in the dirty factory visited yesterday. This is a cleaner-cut, more cheerful set of men. Are they paid more? No? We turn to a

young operative and ask him where he worked before he came to this place.

"Oh, at _____'s," he says.

We ask if he likes it better here. He does. Why? A comprehensive gesture takes in the large windows, the clean aisles, the bright outlook—he has answered. We seek the manager and ask about labor troubles. To our surprise he has them—plenty of them. Asked the cause he is at a loss.

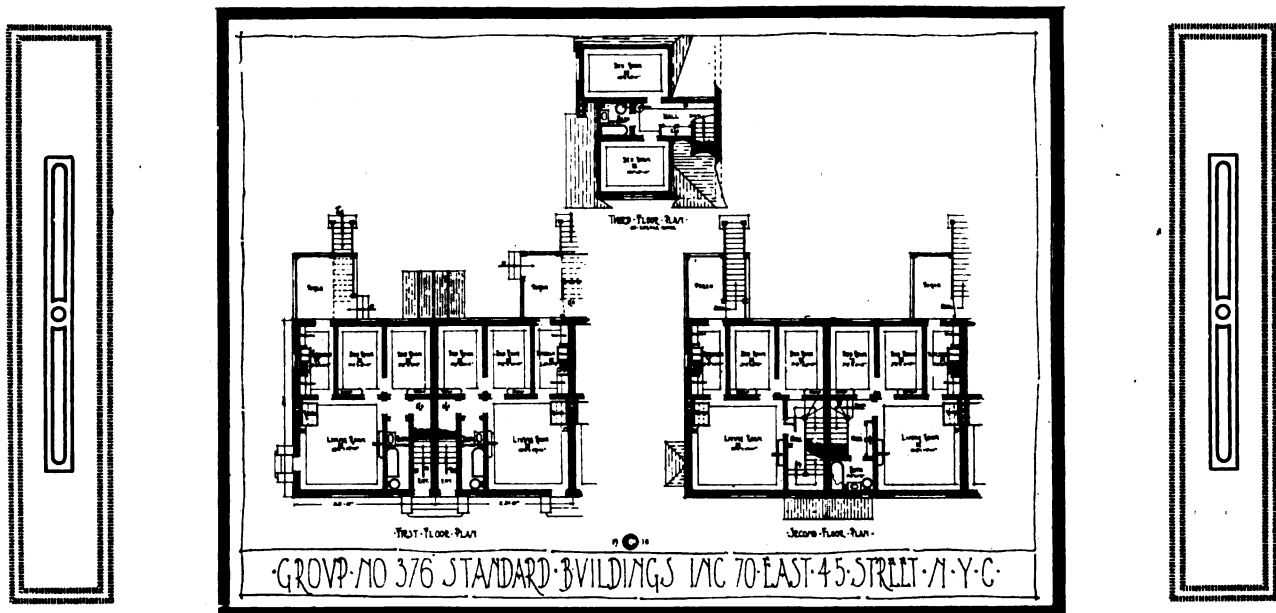
"We have some good men—steady men," he says. "But many of the others are floaters; there is nothing to make them stay in this town. Many of them drink too much and they don't sleep enough—somehow they don't seem to *pull together*. Their real interest isn't here."

So this is the great secret. In his simple words "they don't pull together—their interest isn't here." Where,

the cold-blooded standpoint of dollars and cents, these human machines are rendered less efficient, and consequently less valuable, by the improper conditions of their home life. That thought action which we call "ambition" is paralyzed. The mind is not on the work—pride is killed, life begins *after* the five-o'clock whistle blows; and that life is not a normal one, that interest is not healthy. Ask yourself, Mr. Manufacturer, who loses?

It is not charity, but business, to so house the workmen that their interests will be healthy, and in so doing, healthy bodies, proper pride, and *efficiency* will result.

When one inquires into the history of housing development both here and abroad,* he finds that some are successful architecturally but failures financially; that others are good commercially but bad socially,



Plan of two units of group shown on preceding page

then, is their interest? Have they any? We will go home with them and find this out.

Of course there are exceptions, but the home of the average workman is a place to eat in, to sleep in, and to keep away from as much as possible. Dark rooms in a squalid neighborhood, an unkempt wife worried by the struggle for existence and the maintenance of the home, dirty, quarrelsome children whose playground is the gutter—is it any wonder that the saloon, with its bright lights and garish ornaments, offers temptation? The man has worked hard all day—he wants relaxation and complete change. If his home is unpleasant, what is more natural than that he should seek his pleasure elsewhere? Truly, these are the conditions which cause the loss of thousands—yes, millions—of dollars by our manufacturers every year. From

and he learns that still others—unfortunately a small minority—have been a success from every angle.

It is in England that the model village idea has been most completely worked out. The first of these communities to be built was composed of houses with gardens contiguous or nearby, and was called a "Garden Village." Garden villages soon developed to the extent where special stress was laid upon beauty of house and landscape, and the economic accomplishment of this result by the inhabitants.

As the number of such villages increased and the general idea developed, there grew up two distinct methods of organization; one having the individual ownership of the land as a central idea, but with restrictions that would maintain the character and pur-

* From reports by Perry R. MacNeille, of New York, consulting architect for housing developments.

pose of the development, and the other based upon the idea that the ownership of building and land should rest in the community for the common good, and only the use of the house and plots be assigned to the individual, thereby leaving the latter free to depart if he so willed.

Both plans have the common advantage of saving money by collective operation; of providing the owner or tenant of a small tract of land with many of the benefits of larger ownership; of maintaining by proper restriction the character and purpose of the development, and, finally, of securing a proper social atmosphere.

The Garden Village plan had the advantages of individual ownership of land, of enabling the individual to reap the entire benefit of any appreciation, and increasing the security of invested capital by making the borrower personally interested in maintaining the property at the best possible standard. It has been found, on the other hand, among Co-operative Tenants Societies, that the tendency sometimes existed to let the property run down in order to increase the immediate profits.

The second plan, that of community-owned property, which has become known as the Co-Partnership Tenants Plan, has only the advantage of greater industrial independence (the tenant feeling free to move from place to place) of insuring to the individual a share of the profits from appreciation of the value of the surrounding property that results from the development, and, lastly, the benefit of collective ownership.

The new idea, which is of recent growth, and might well be called the "Industrial Tenants Plan," is the co-operation of capital and labor for their mutual benefit.

The industrial community in America must necessarily differ from the English idea, owing to the fact that the English people are accustomed to an aristocracy. The common people in time not long past practically existed according to the pleasure of this aristocracy, which constituted the land-owners of the country. The common people were merely tenants upon the great estates. Their daily life was ordered by the lord of the manor. They could not till the ground, harvest the crops or marry without his consent. Even to-day, it is only by the generosity of the aristocracy that the common people of England can ever enjoy the beautiful parks, the wooded drives and walks with which the country abounds.

It is natural, therefore, that a people accustomed to taking their unsophisticated pleasures at the sufferance of others should find in a Co-partnership Village a welcome advance toward personal freedom and independence, while an American might find the restrictions of community ownership objectionable.

The foregoing paragraphs, wherein we dealt with

the need for proper home conditions for the working man, show clearly the conditions of living which must be maintained to stimulate and encourage thrift and morality. Families which are naturally thrifty and moral should be scattered throughout the community for the sake of their influence in the general social tone. The beautifying of the grounds and gardening should be encouraged, as well as sports, the athletics and the formation of the various clubs and societies. The paternalistic trend in the development of the village must be carefully avoided. What is done along the lines of betterment must be done by starting the impulse within, and not by imposing a line of conduct from without. In this way the individual is enfranchised and the true American spirit created.

In the housing problem race characteristics must never be forgotten. The Anglo Saxon wants a parlor and other modern conveniences. The Scandinavian likes a living room where the entire family can gather. These people are neat housekeepers, but are not so dependent upon labor-saving devices as are the Americans. The Portuguese are thrifty and desire above all things to own their own homes, in the maintaining of which they take great pride. On the other hand, the Slav makes a poor tenant. He abuses the house and property he occupies, and has no dependable or general traits which can be provided for.

When improved housing is initiated or aided by manufacturing concerns it is only fair that they should benefit by having a more stable population from which to recruit their employees, and that they should have a body of workmen that are more efficient and more reliable; but, on the other hand, it must be borne in mind that no truly model village can exist where the employers of its people do not recognize the rights of the employed. Chief among these rights is that of adequately paid and reasonably steady work. In dull times something can be done by making repairs and by working all of the force on part time, instead of a portion of it on full time.

Another cause of distress is the ever-present fear of the death of the wage-earner. Many a man is deterred from buying a home on the instalment plan by the fear that he may die before payments are completed and his wife lose the property thereby. Provision should be made for this calamity, and also for the maintenance of the family during the first year, lest the property be sacrificed to provide sustenance. The insurance problem and its solution will be discussed at another time.

Building the Village

In selecting the ground for a model village care must be taken to obtain a pleasant location, one where abutting property is of a desirable nature. The ground should be purchased at acreage prices in order that the community may enjoy the natural increase in land values which its very existence must make certain.

The first step in the planning of the model village is to lay out areas for the civic, business and residential districts, and then so arrange the roads that they will make available the greatest number of building sites consistent with the purposes of the development, and give to each site the maximum advantage of which it is capable. This must be done in a manner that will preserve and enhance the natural beauties of the place, and the work of construction be as economical as possible.

It is necessary next to determine whether the development of the village shall be haphazard or along prescribed physical and social lines. Some students of the subject feel that its development should be unhampered either by social or physical restrictions. It would seem that placing together arbitrarily the homes of heterogeneous people will not create that spirit of equality which is so desirable. It is attained in more subtle ways—by abolishing privileges that are based on social standing, by developing sports and by creating civic interest.

In any association of human beings those of like taste gravitate together. Society has always grouped itself in cliques, and always will, and the advance that civilization has made toward democracy has not been in the abolishing of cliques, but in their formation on more intelligent lines.

At one time the association of individuals was formed on common parentage or relationship, and tribes existed. Later it was common occupation, and the different guilds and trade societies were formed. Now, common interests and similarity of tastes bring people together in social sets. Where houses are built one close to another it is of very great importance that neighbors should have this similarity of tastes and interest. A Puritanical family, given to the strict observance of Sunday, does not wish to live next to a family where the day is essentially one of social enjoyment. A man of æsthetic tastes, whose principal delight is in a quiet and beautiful garden, does not care to have as a neighbor one who is raising pigs and chickens. Furthermore, the man who is surrounded by neighbors who are able to live more expensively than he can is apt to become discontented and unhappy. For all these reasons the proximity of houses of different classes, instead of creating a feeling of equality, is in danger of producing the reverse, and the better-to-do neighbors are apt to either ignore or to patronize the poorer ones. From all these considerations it would seem better to divide the village into zones at the start.

The growth of the village should be regulated by selecting successive streets for development, and opening each only when its predecessor is at least half sold or built upon. This will save initial expense in the building of roads and landscaping, the beauty of the village will be increased and social intercourse be promoted. Vacant lots should be used temporarily for

playgrounds or gardens, and should not be permitted to become a scrapheap or an eyesore. The ownership of the streets should be deeded to the municipality as a means of increasing civic pride.

Restrictions

The following simple restrictions are proposed:

1. All persons purchasing or renting property in the village must be approved by a majority vote of the Owners' Association.
2. All plans for buildings or other structures, their location and surrounding grades, must be approved by the consulting architect of the Owners' Association.
3. Buildings shall not be wider than 70 per cent of the width of the lot, nor shall the total area of buildings on any plot cover more than 30 per cent of the area of the plot, except in the zone for stores and apartments.
4. All buildings shall set back at least (to be decided on) feet from the street line.
5. The buildings shall not be over three stories, or 35 feet to the plate line.
6. Buildings shall have masonry walls in the civic and business zones and frame veneered with at least 4 inches of masonry in the residential sections. *All roofs shall be of incombustible material.*
7. Any form of manufacture or the sale of intoxicating liquor is prohibited. Billboards and advertisements, except signs on stores and professional signs on buildings, are barred, and no outside water-closets or privies allowed. The keeping of animals, except domestic pets, is subject to permit of the Owners' Association.

In the business zone, or zone of stores and apartments, not more than 80 per cent of corner lots and 60 per cent of inside lots shall be covered by buildings.

In the residential zones no lot shall be less than 40 feet in width, and must have at least 4,000 square feet of area. Buildings shall be used for residential purposes only, and there shall be no stores or apartments in these zones.

Stables and farm buildings shall be permitted in the zones designated by the Owners' Association, but their total area shall not exceed 30 per cent of the area of the lot on which they are situated. No uncovered manure or compost heaps or other breeding places for flies and mosquitoes will be permitted.

Buildings

When the space available for each family is small it would seem desirable that the houses be erected in blocks or semi-detached, for both physical and artistic reasons. If they are built in blocks it permits the broader sides of the houses to face front and rear and to gain increased sunshine and air, for the windows on the sides of the houses placed near together avail little and give an objectionable view of the interior of the

neighboring house. If the buildings are semi-detached, the distance between the building groups is increased with advantages. Little is sacrificed in building thus, since the attached side of the house is used for halls and stairs. Experience has shown, however, that detached houses sell better, and these should be built in preference to the semi-detached houses unless experience in the development in hand inclines otherwise.

The Standard Building, Inc., designs, as shown on the insert plates for cottages and houses, cover accommodations and costs ranging from five rooms and bath, to cost \$1,500, exclusive of land, to eight rooms and bath at a cost of \$6,000.

There are two kinds of construction that seem best available for use in community building, frame veneered with brick and tile block walls. Frame construction is out of the question, owing to its inflammability and consequent conflagration hazard.

Frame veneered with brick makes an attractive-looking house, but there is danger of shrinkage of the wood, which tends to loosen the bond between the wood and the veneer, and the walls are quickly destroyed by an interior fire.

Tile block construction has the advantage of fire-proof walls; is a better insulation against heat and cold, and, owing to the fact that the interior plastering is applied directly to the blocks, eliminates the furred spaces between plaster and walls that make such excellent channels for the travel of vermin and fire.

Tile block construction can be executed in three different ways: *First*, with special tile blocks, which have a dull surface on the exterior similar to brick, and keys on the interior for holding the plaster. These blocks run about 12 inches in length and 5½ inches in height, giving a pleasing proportion when set with wide mortar joints. *Second*, tile blocks covered with stucco. These blocks have keys on both sides and are covered with plaster on the interior and with cement stucco on the exterior, or veneered with brick on the outside so that the appearance of a solid brick wall is given.

In cost of maintenance there is a saving in masonry construction over frame construction. The saving in the renewal of outside painting is about seven-tenths of one per cent annually; a saving in the deterioration of outside woodwork of about two-tenths of one per cent, and a saving in insurance of about one-tenth of one per cent—a total annual saving on the cost of the house of one per cent. It is clear, then, that in maintenance alone a masonry house will have its slight initial excess cost in a very few years. Then, too, there is the saving in fire risk. It has been estimated that the average fire loss in frame dwellings is one in sixty, and insurance rates indicate that the loss in frame dwellings is twice that of buildings with masonry exterior walls and incombustible roofs.

In lowered fire risk, then, the saving in a masonry

house over that of a frame building is about .83 per cent of the cost of the house annually. This means that the masonry house pays for excess in cost in about six years.

The saving in human life is intangible and harder to figure in money values. Statistics have been prepared on the fire losses in this country which show many deaths and injuries from fires. From the humane standpoint the masonry house is better than frame.

Standard Buildings, Inc., of New York City, a concern which has specialized in the planning and construction of industrial villages which have been particularly successful, has compiled an interesting table of costs of various types of house construction using different material. The various houses indicated are from their special designs, and a careful study of the comparative costs will show that safe construction is practical.

COMPARISON OF COST OF DIFFERENT TYPES OF CONSTRUCTION

In the following table, the typical houses designed by Standard Buildings, Inc., are arranged in the order of their cost. This cost for each house is placed in the column which describes the form of construction in which the house has been designed. In the remaining columns are placed the additional cost (to the right), or the saving in cost (to the left) of changing the construction to that indicated at the head of each column.

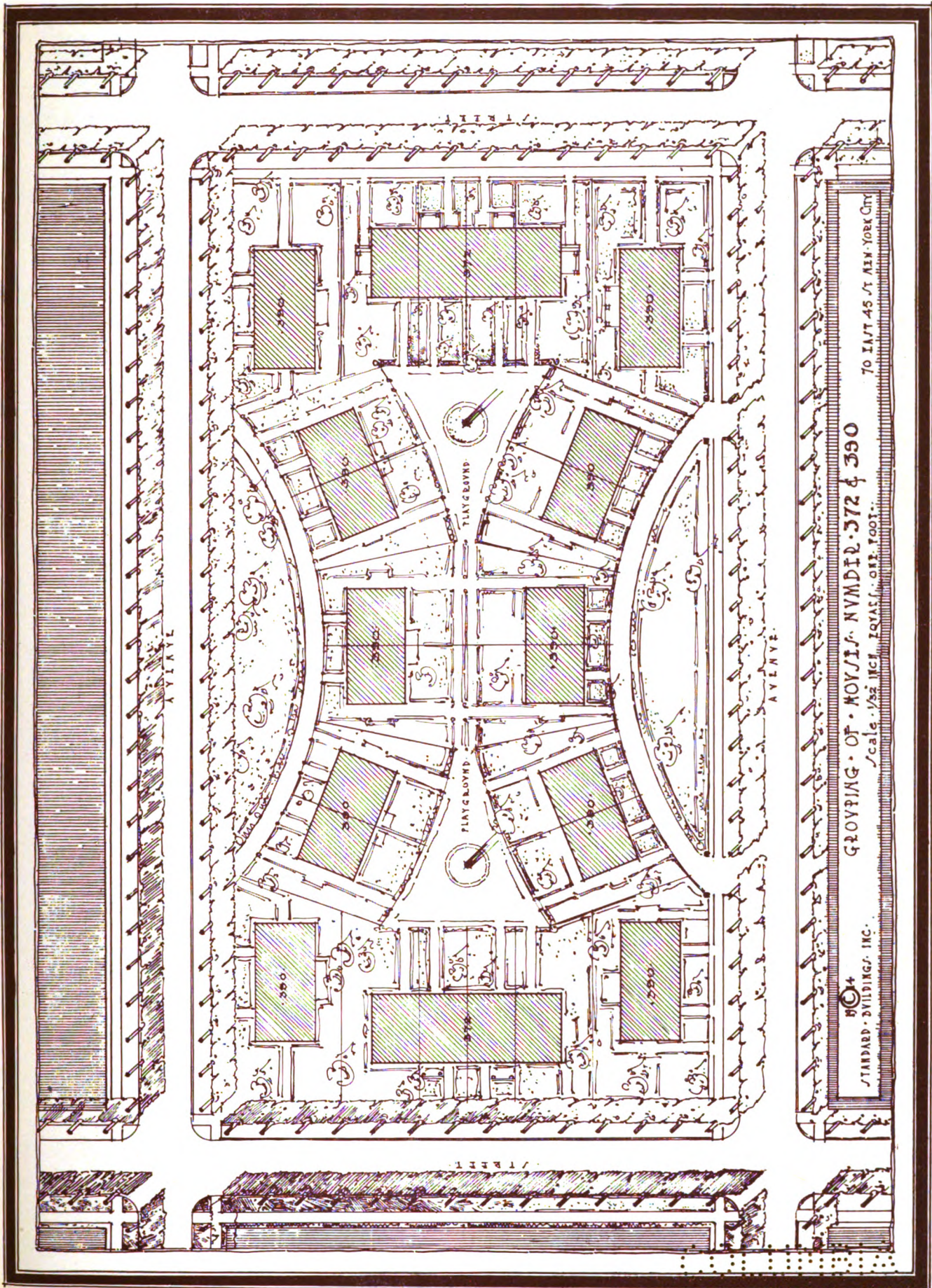
House No.	Construction.	Special Tile.	Wood Clap-board.	Stucco on Tile.	Brick Veneer on Wood.	Brick Veneer on Tile.	Solid Brick.
A	Special tile and wood.	\$1,500.00	\$18.00	\$41.00	\$47.00	\$63.00	\$76.00
B	Special tile and wood.	1,550.00	18.00	41.00	47.00	63.00	76.00
C	Special tile.	2,076.00	32.00	50.00	62.00	84.00	100.00
D	Special tile and wood.	2,354.00	33.00	52.00	64.00	86.00	103.00
E	Special tile and stucco.	2,509.00	30.00	60.00	76.00	100.00	122.00
F	Special tile and stucco.	2,572.00	30.00	60.00	76.00	99.00	121.00
G	Special tile and stucco.	2,615.00	31.00	62.00	79.00	103.00	126.00
H	Special tile and stucco.	2,744.00	46.00	91.00	114.00	148.00	182.00
I	Special tile and stucco.	2,878.00	34.00	66.00	84.00	109.00	134.00
J	Special tile and stucco.	2,880.00	16.00	46.00	61.00	97.00	106.00
K	Special tile.	2,937.00	44.00	86.00	96.00	113.00	148.00
L	Stucco on tile.	26.00	42.00	2,974.00	10.00	61.00	62.00
M	Stucco on tile.	77.00	42.00	2,987.00	10.00	62.00	62.00
N	Special tile and stucco.	3,146.00	43.00	94.00	106.00	139.00	170.00
O	Stucco on tile.	91.00	50.00	3,303.00	13.00	65.00	75.00
P	Stucco on tile.	95.00	52.00	3,697.00	13.00	76.00	77.00
Q	Special tile and stucco.	3,804.00	56.00	112.00	140.00	182.00	224.00
R	Special tile and stucco.	3,846.00	45.00	90.00	112.00	146.00	179.00
S	Stucco on tile.	115.00	68.00	4,954.00	157.00	92.00	94.00
T	Brick veneer on tile.	307.00	250.00	105.00	170.00	5,935.00	102.00
U	Special tile and stucco.	8,170.00	110.00	220.00	275.00	350.00	440.00

Interest in proper housing conditions exists not only among manufacturers, but among those interested in city and town planning and the relief from the congested conditions which constitute a serious problem in cosmopolitan existence. The State of Massachusetts has been particularly interested in this subject within recent years, and the state constitution has just been amended as follows:

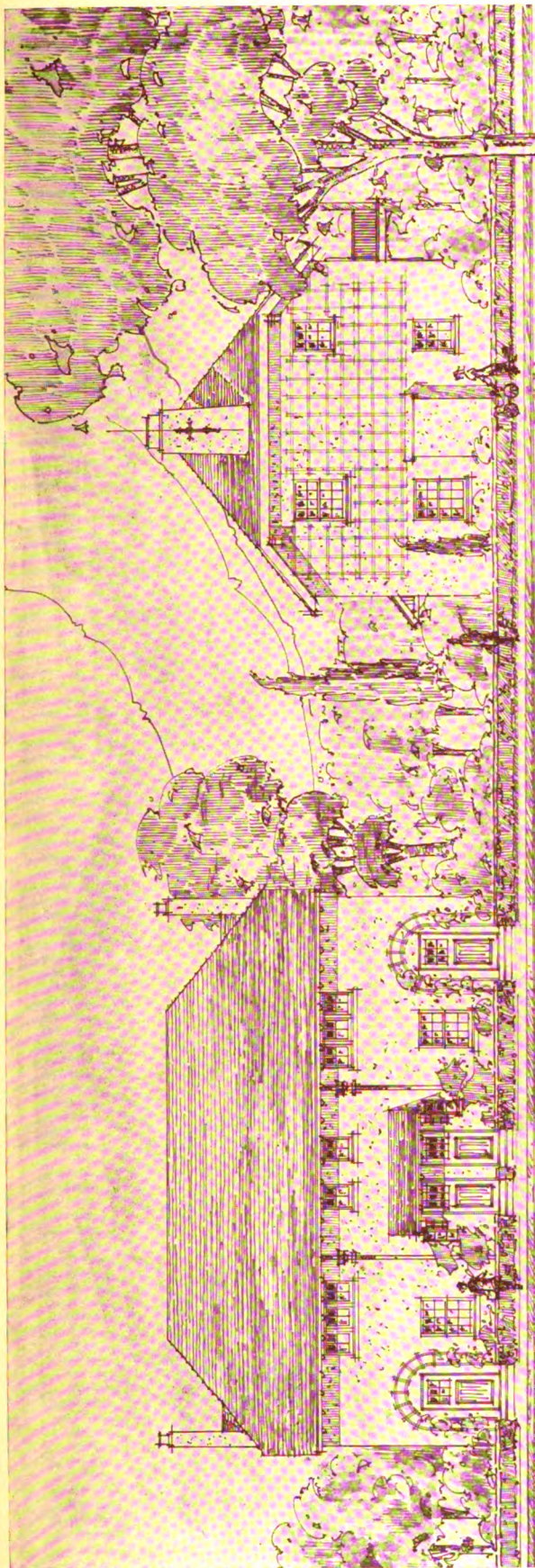
"The General Court shall have the power to authorize the Commonwealth to take land and to hold, improve, subdivide, build upon, and sell the same for the purpose of relieving congestion of population and providing homes for citizens; provided, however, that this amendment shall not be deemed to authorize the sale of such land or buildings at less than the cost thereof."

Some time ago the State Supreme Court of Massa-

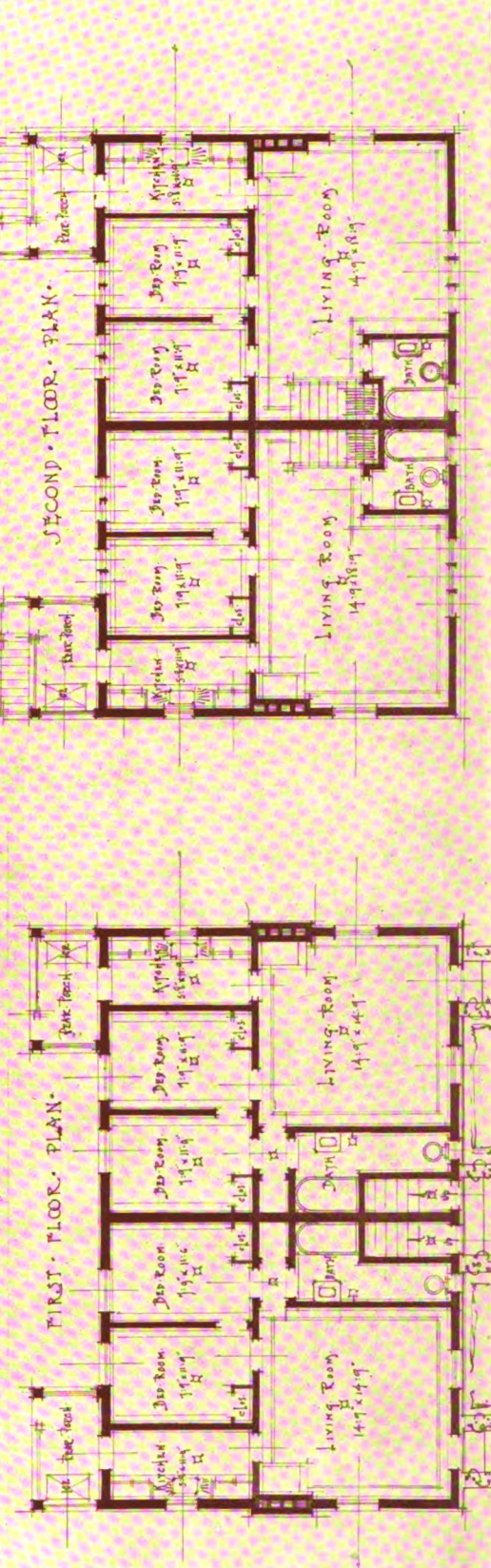
CONSTRUCTION—SAFE HOMES



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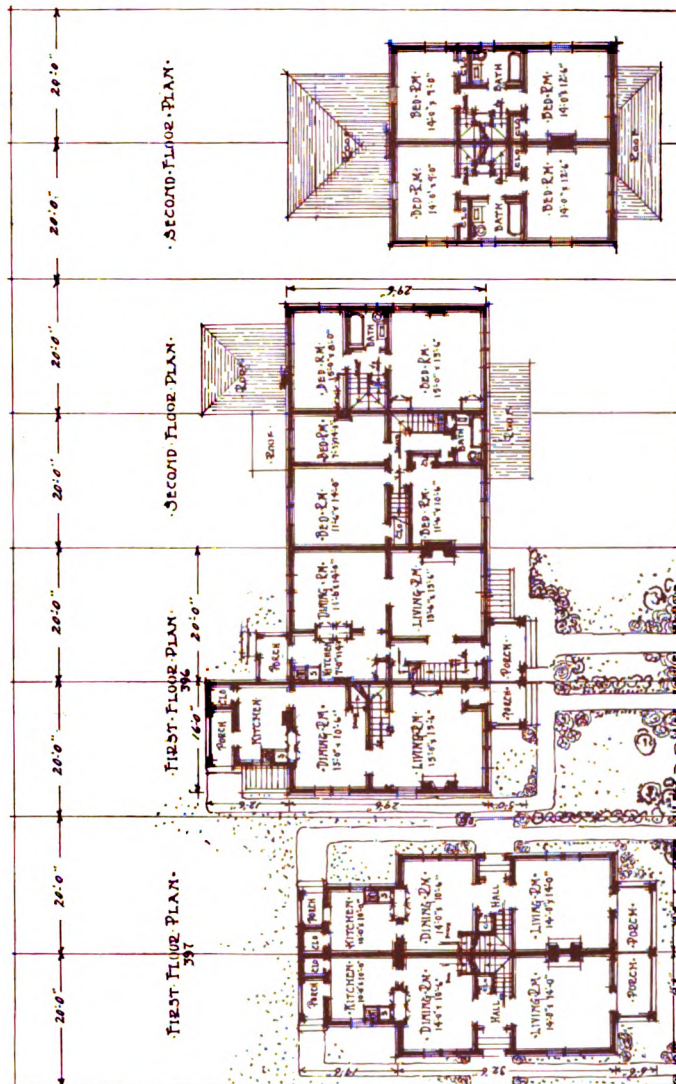
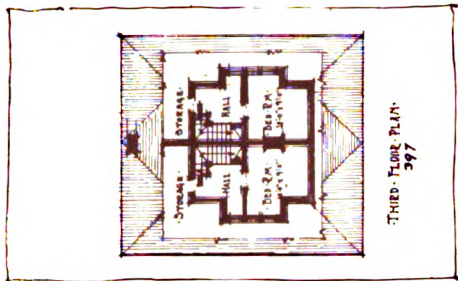
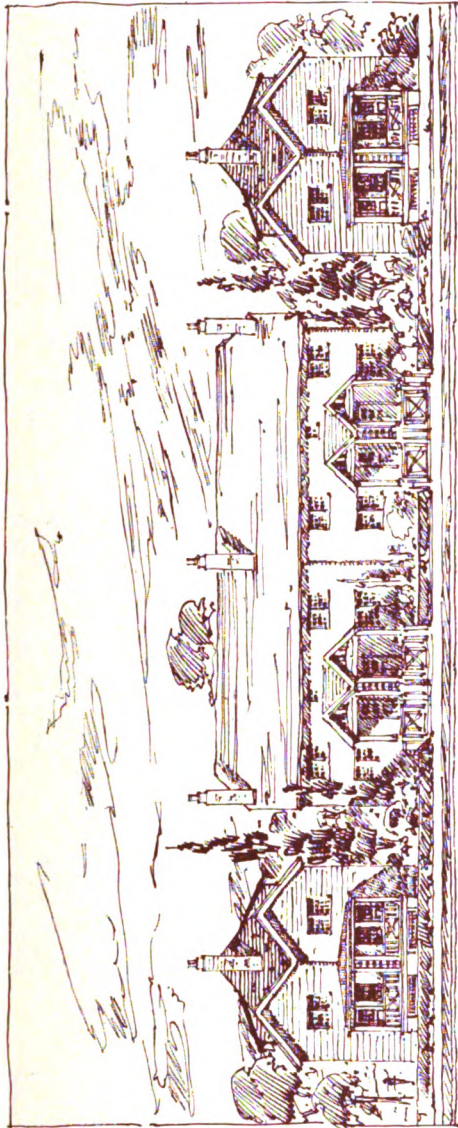
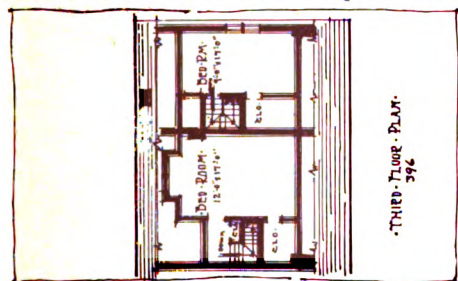
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STANDARD BUILDING, INC.
WORKING MEN'S COTTAGES,
GROUP NUMBER 464,
70 EAST 45 ST., NEW YORK



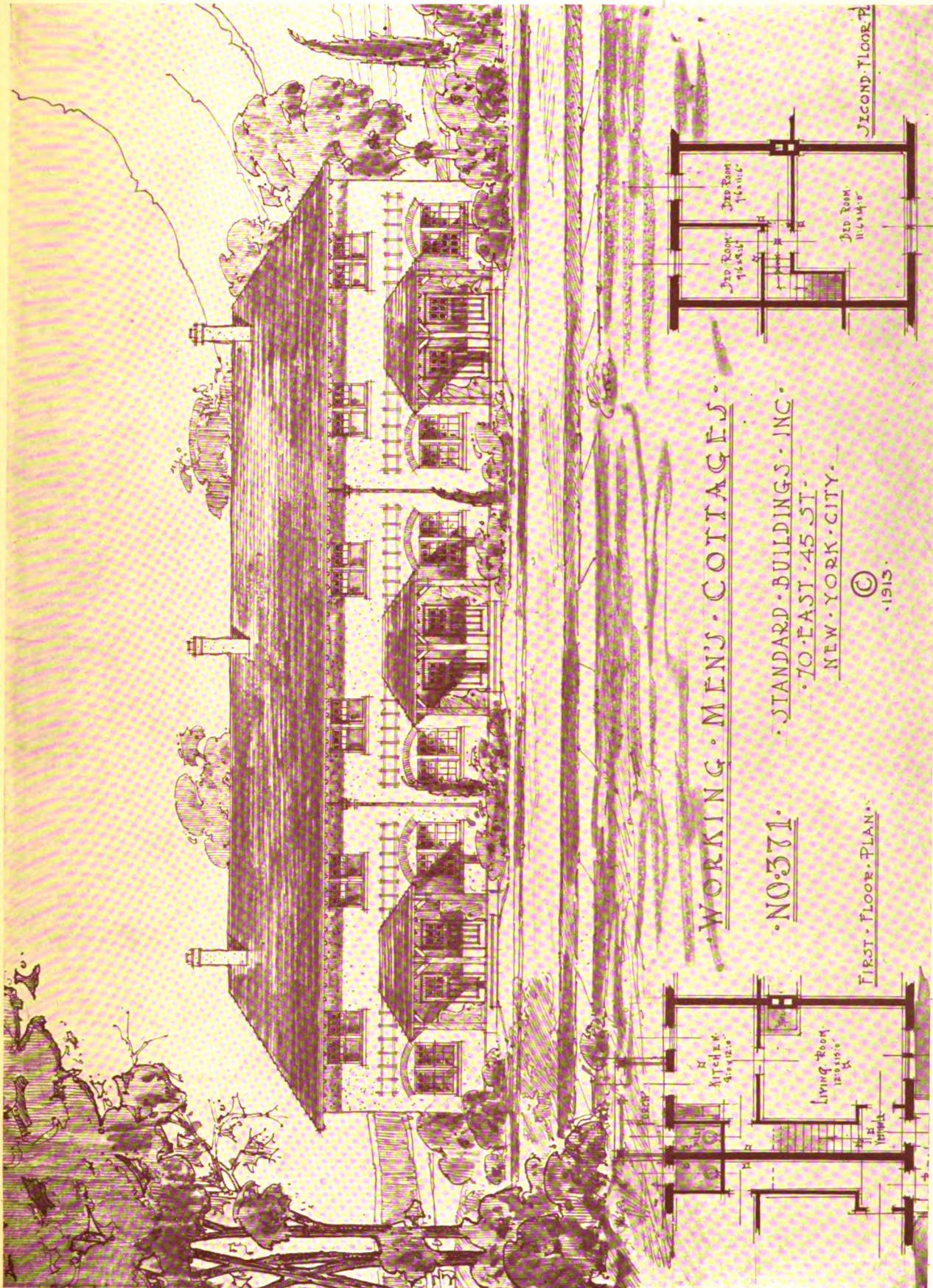
Supplement to CONSTRUCTION, New York City, December, 1915

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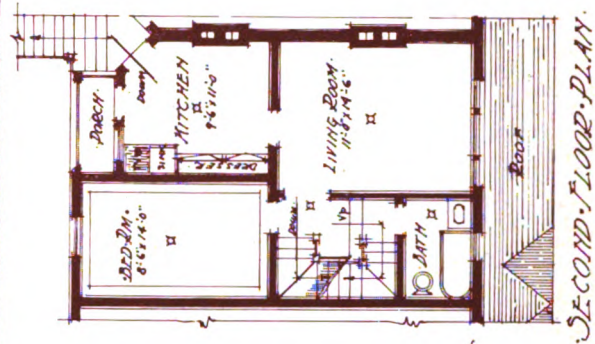
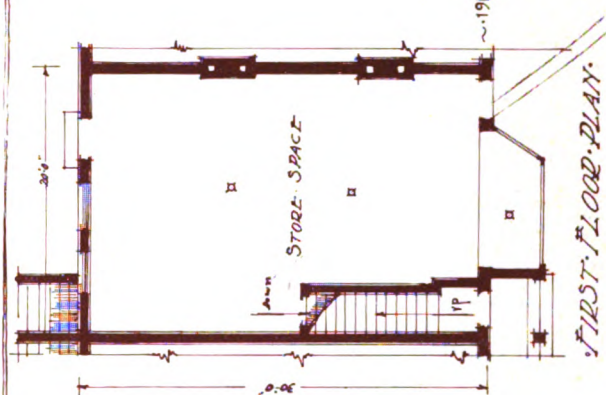
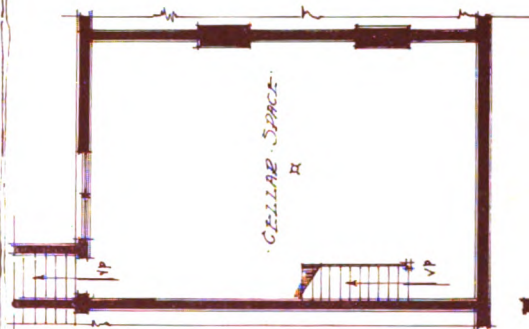
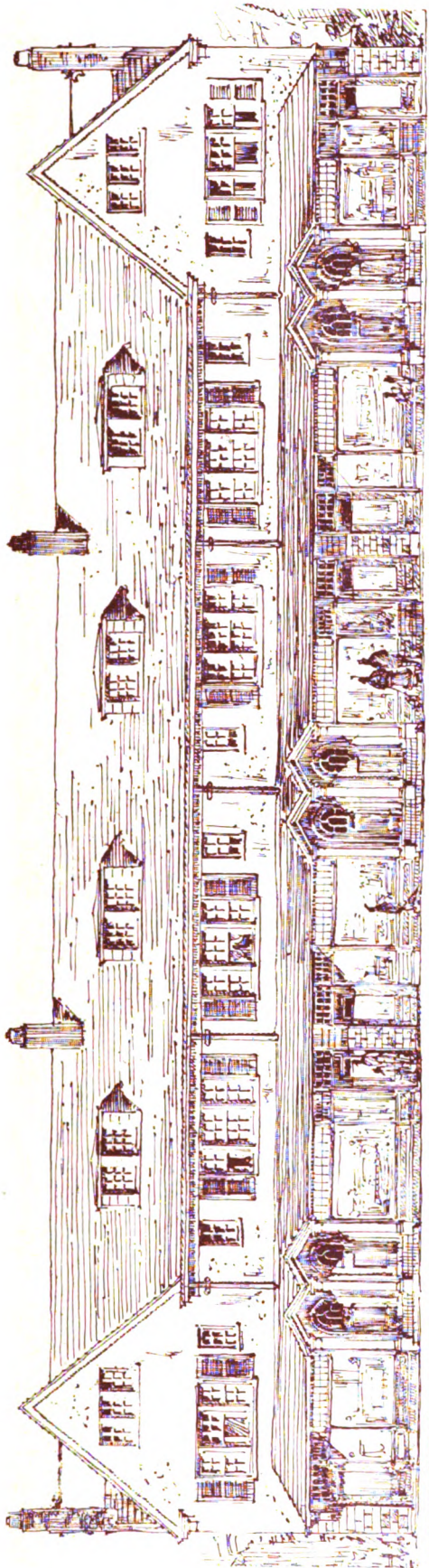
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CELLAR PLAN.

FIRST FLOOR PLAN.

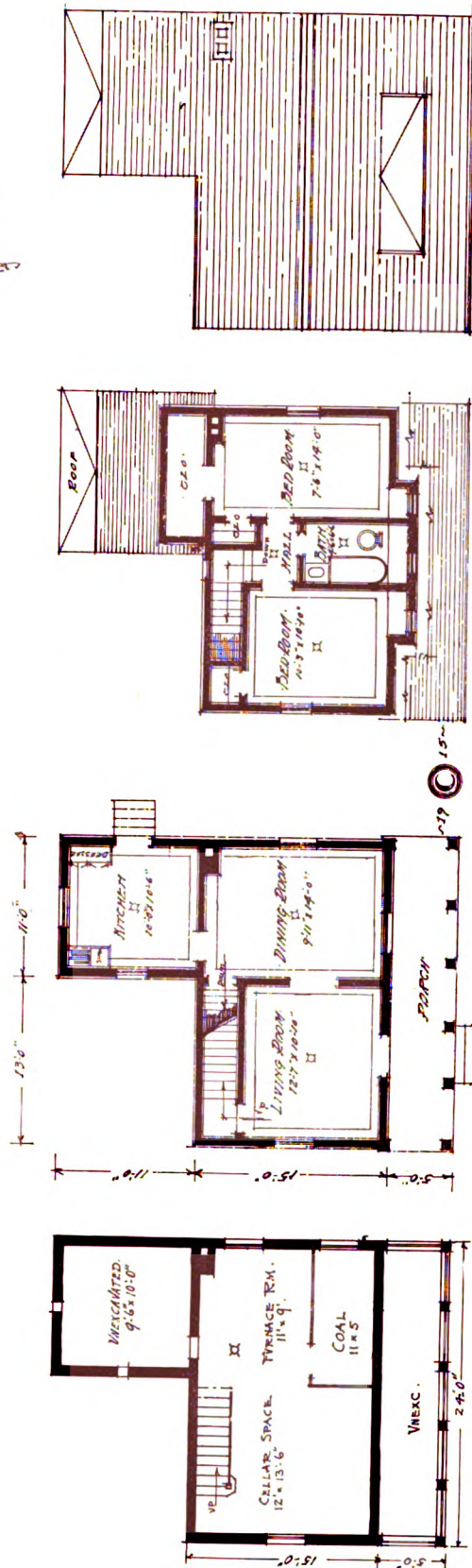
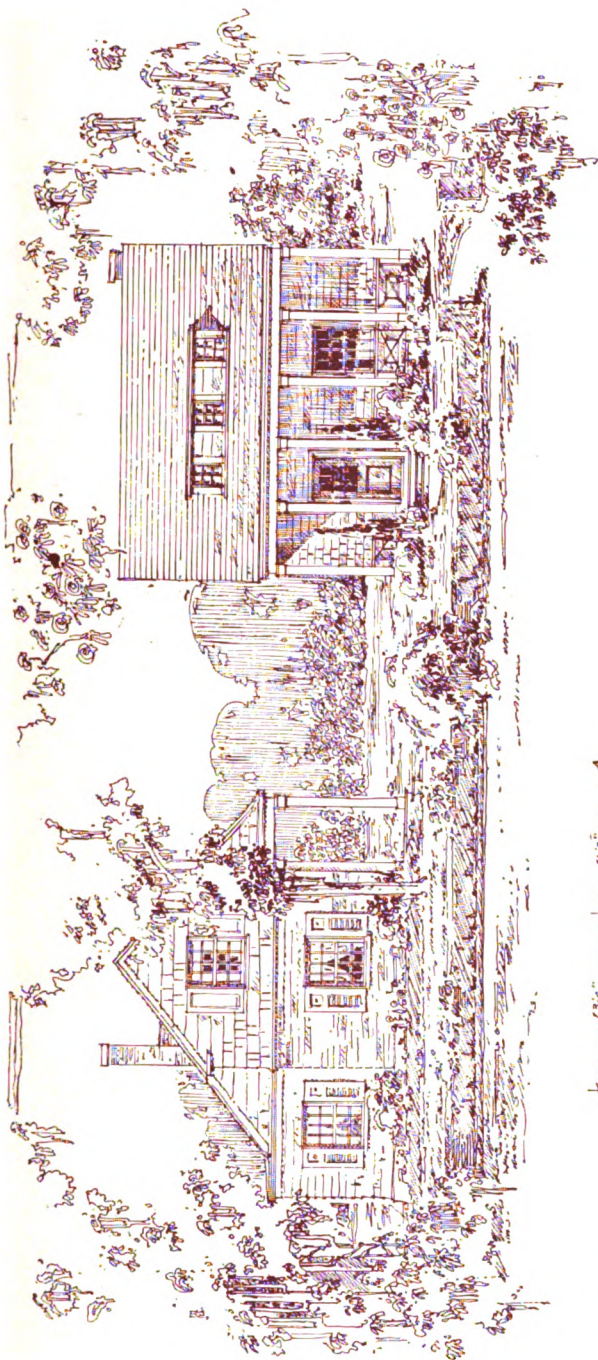
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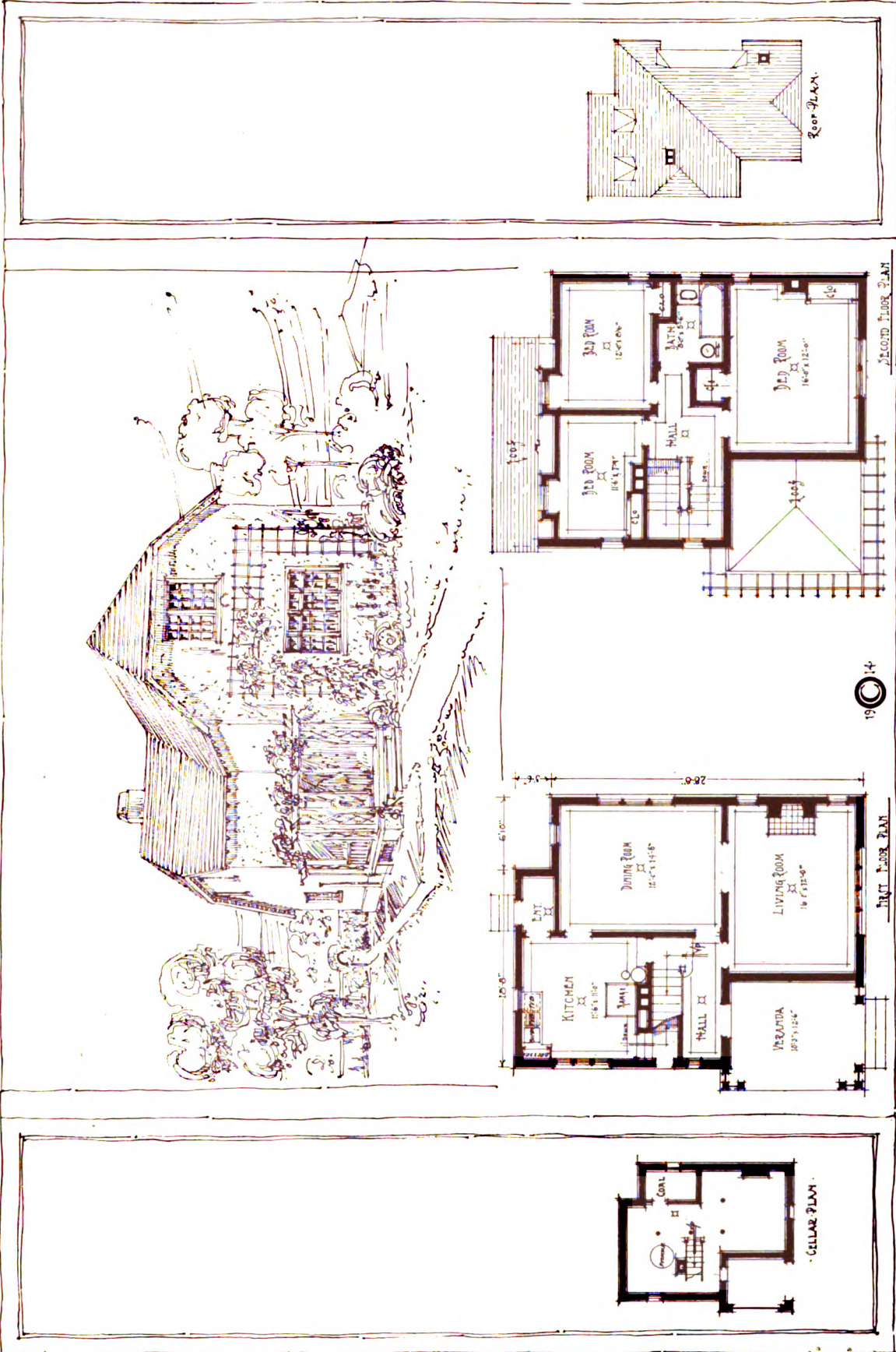
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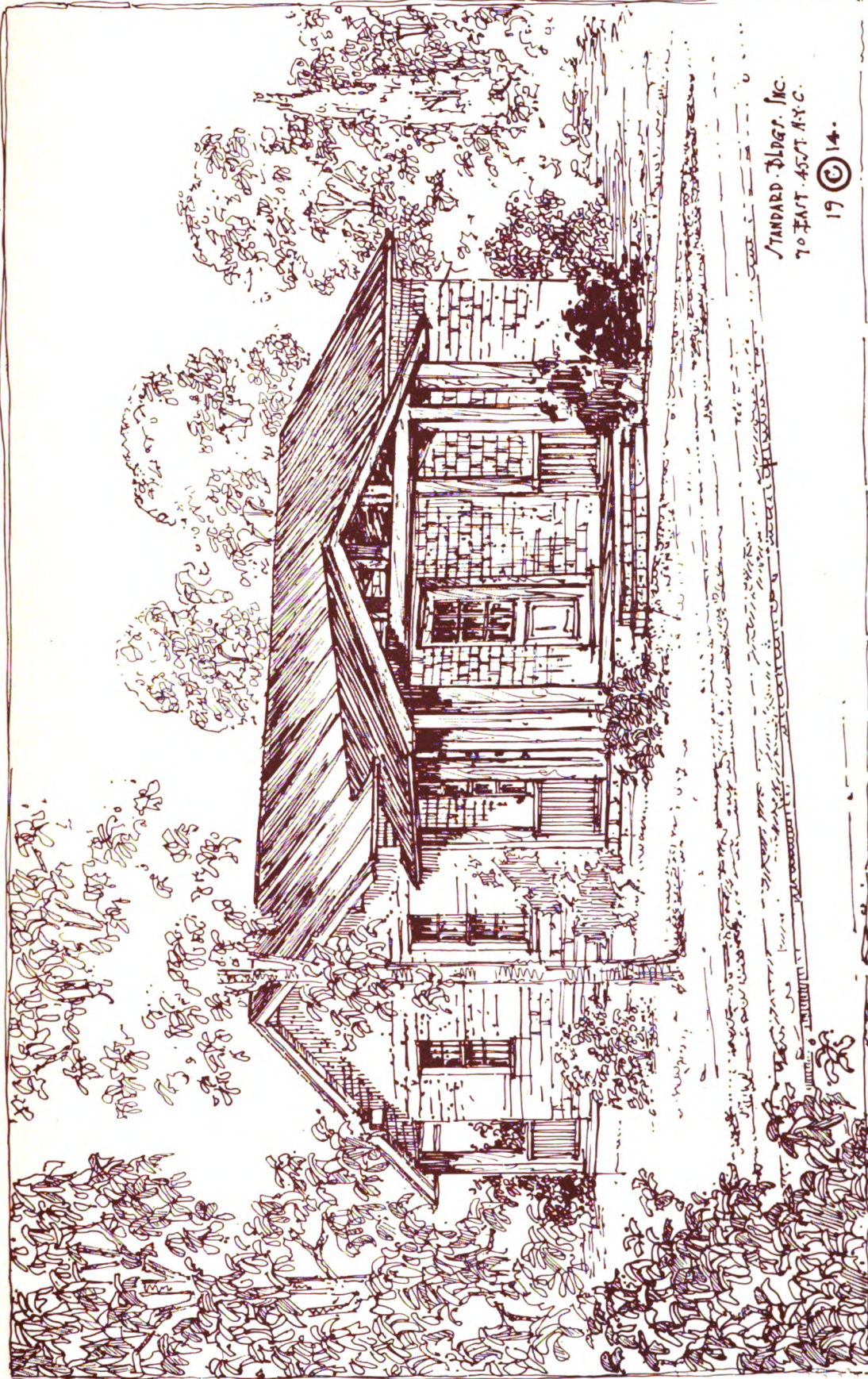
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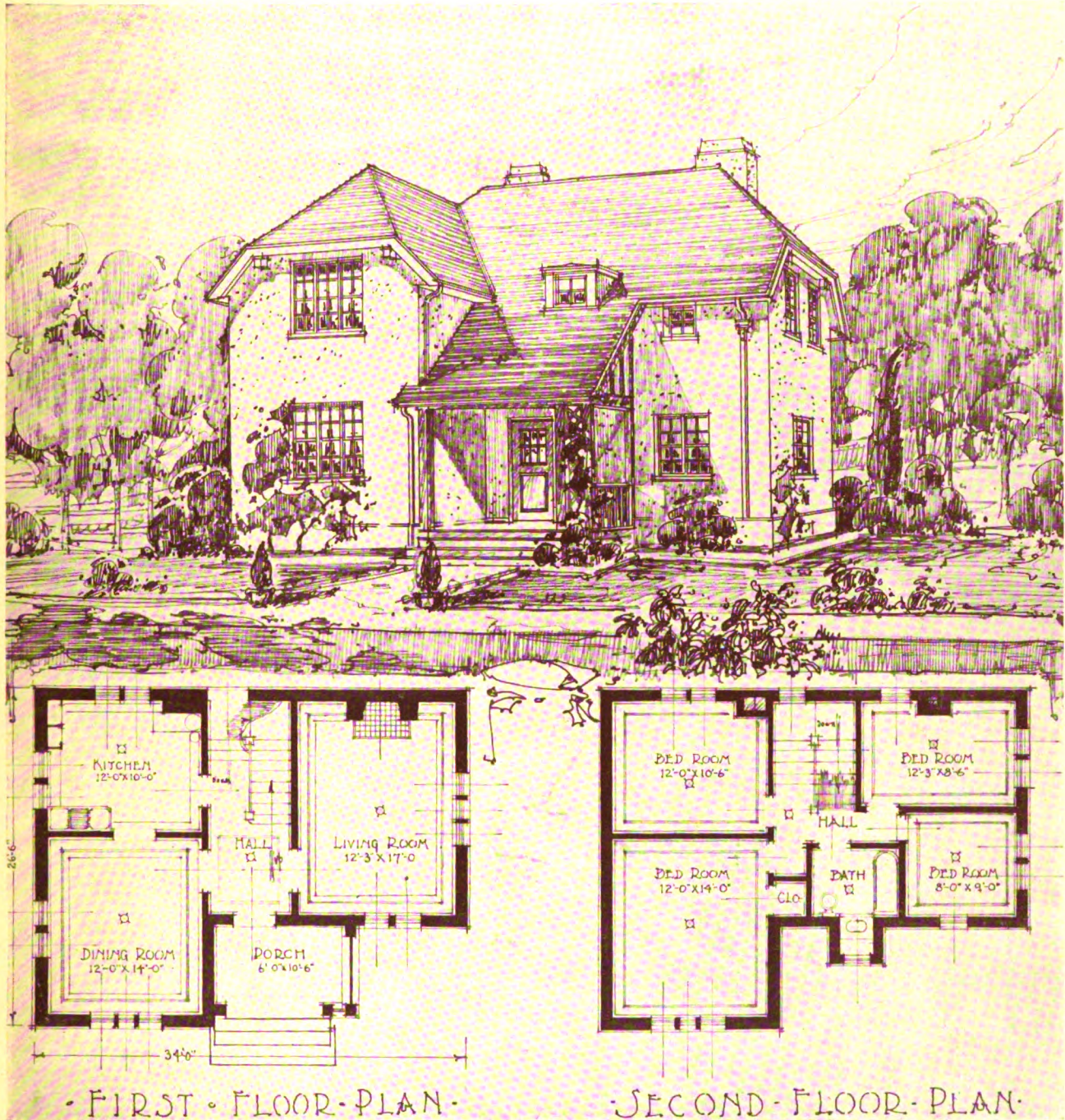
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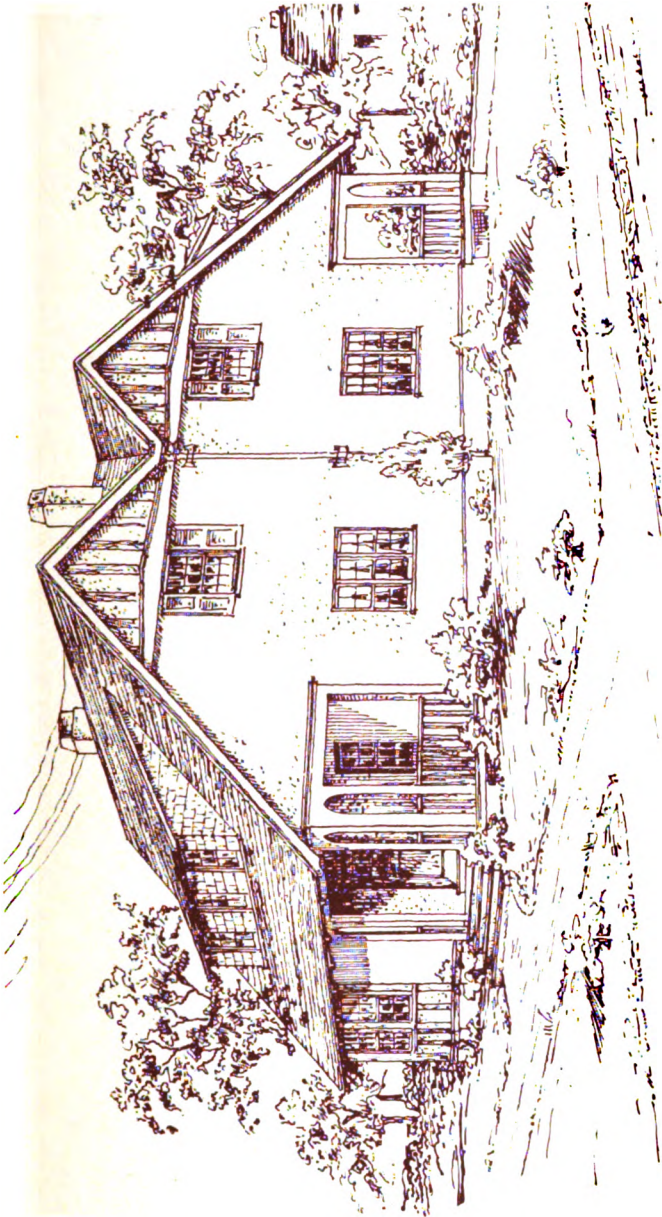
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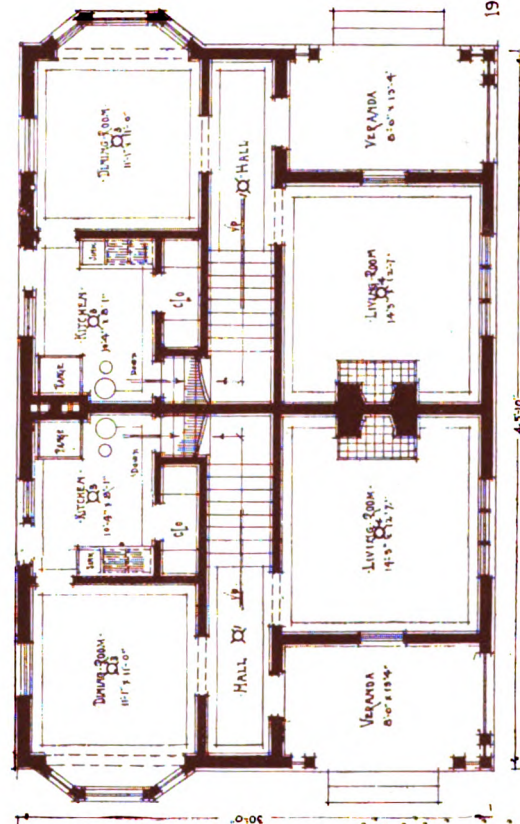


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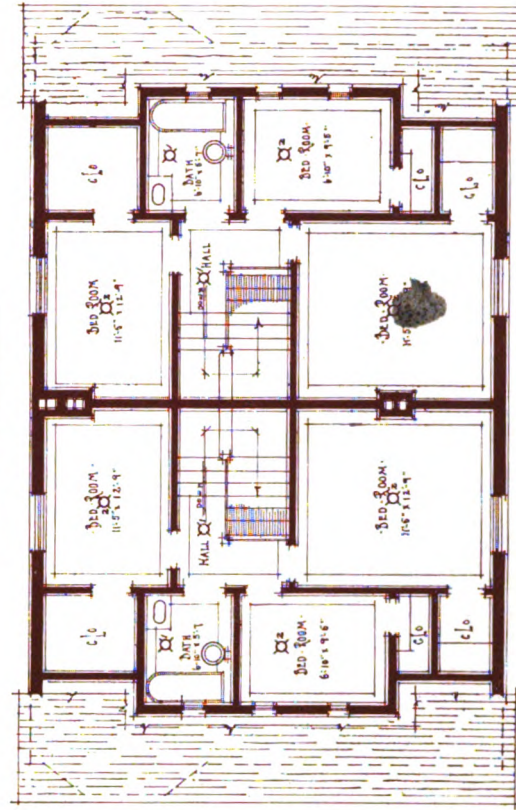
FIRST FLOOR PLAN



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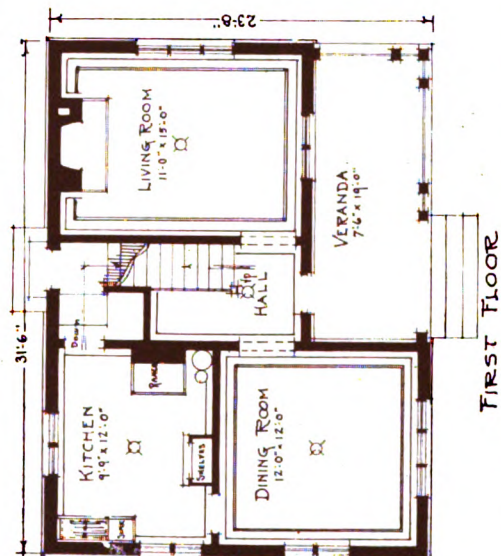
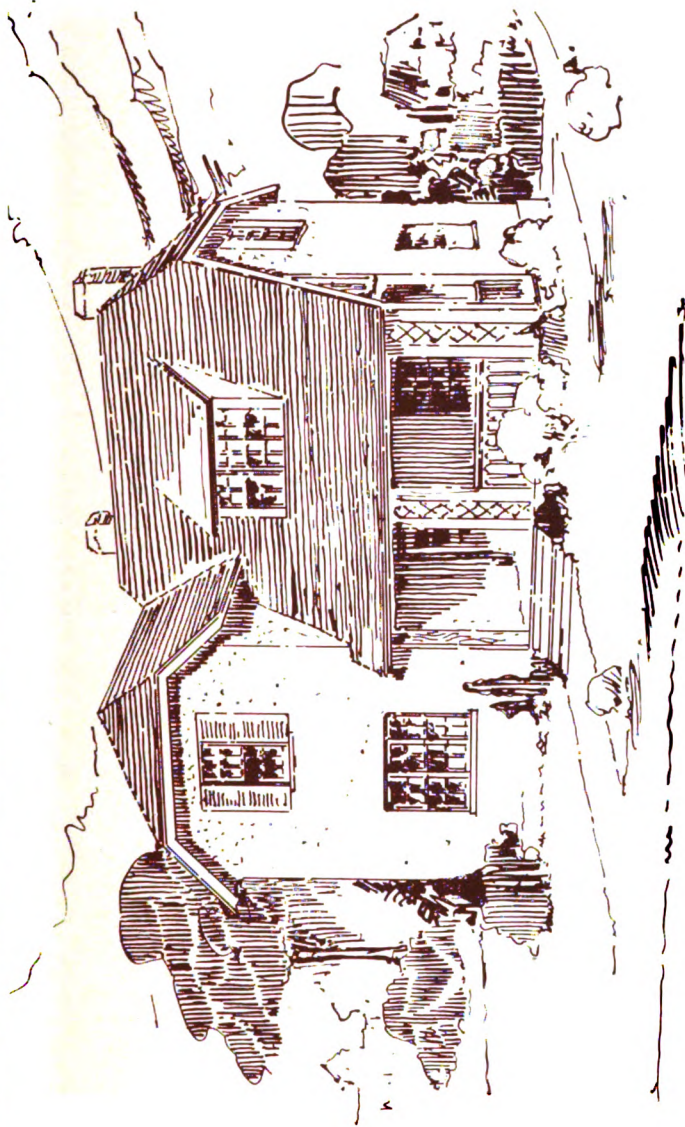
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SECOND FLOOR PLAN



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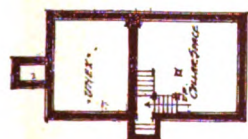


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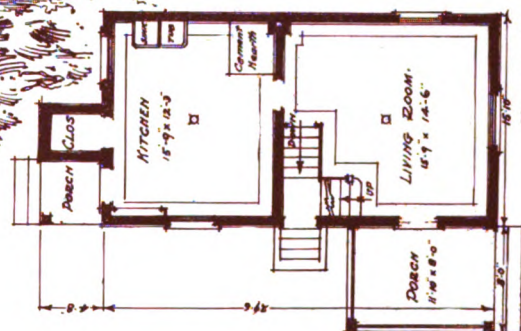
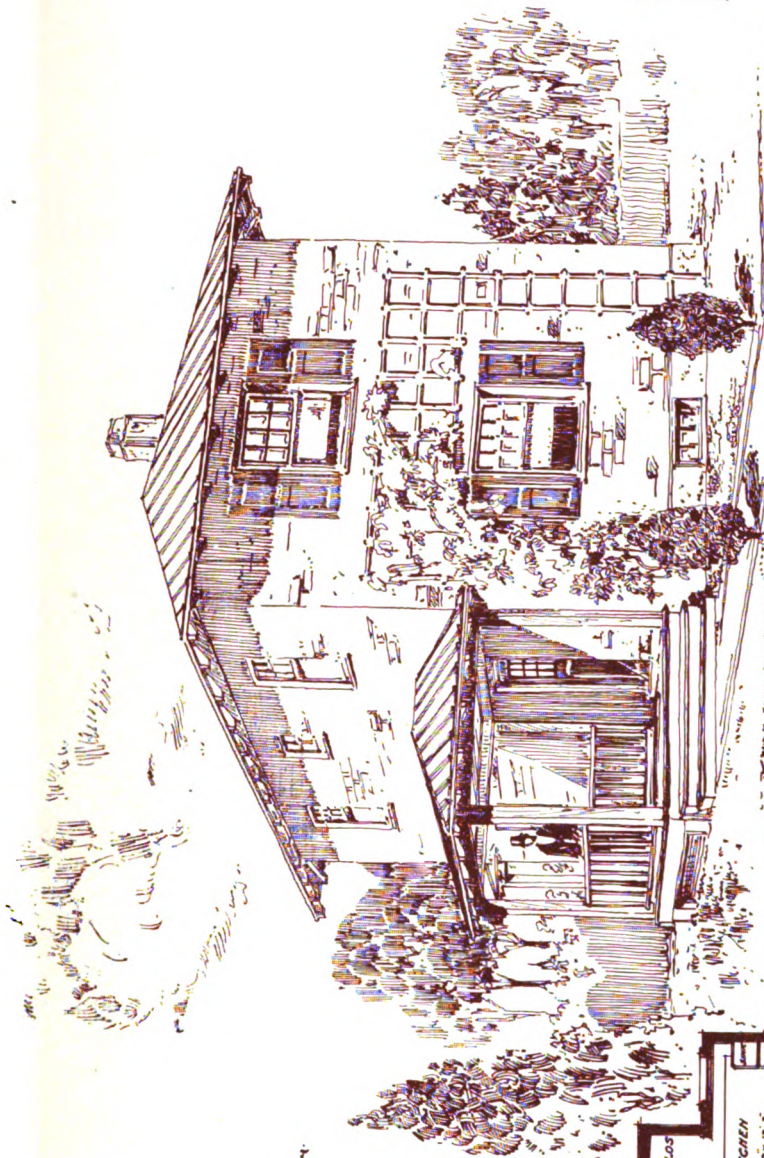
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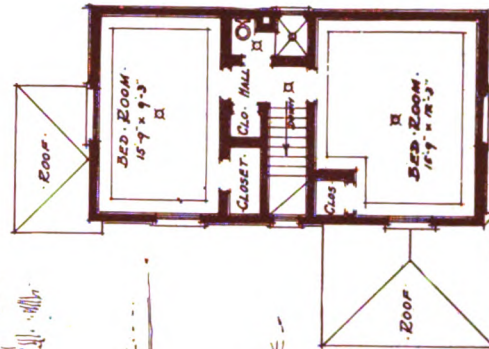
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CELLAR PLAN.



• FIRST FLOOR PLAN •



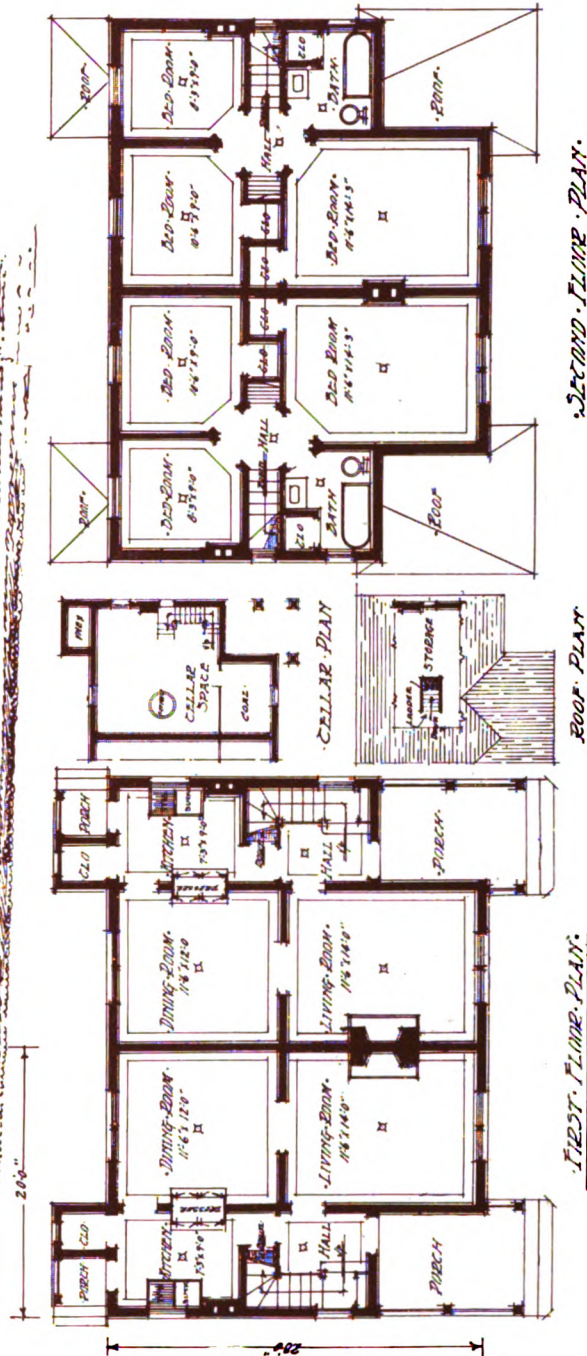
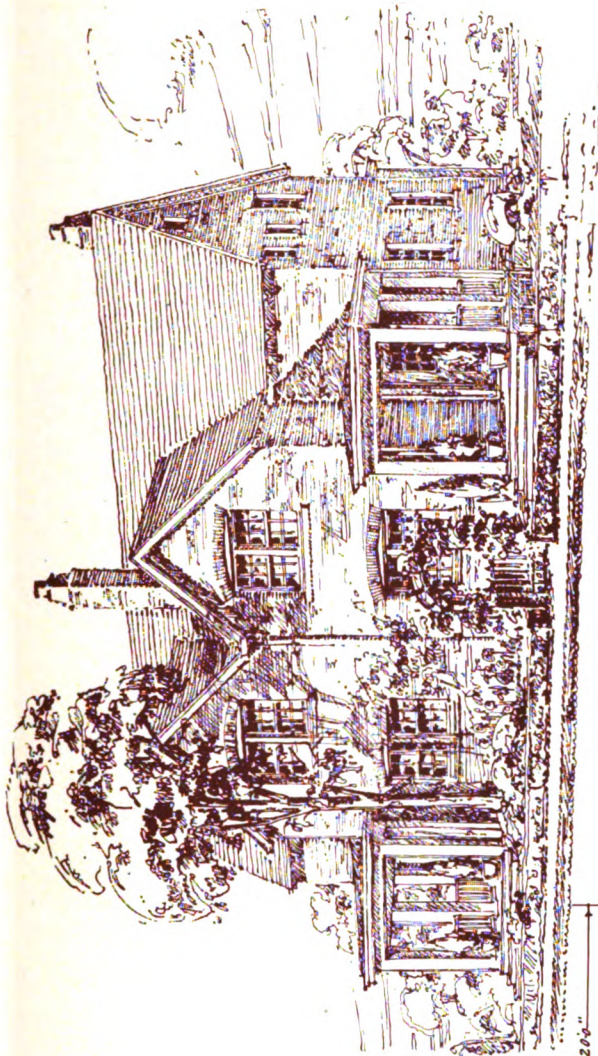
• SECOND FLOOR PLAN •

• CAROLINA COTTAGE •
• STANDARD BUILDINGS, INC. •
• 70 EAST 45TH ST. • NEW YORK CITY •
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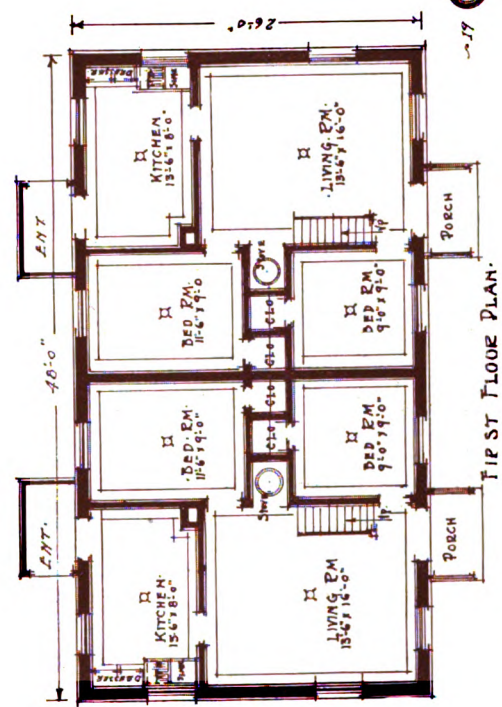
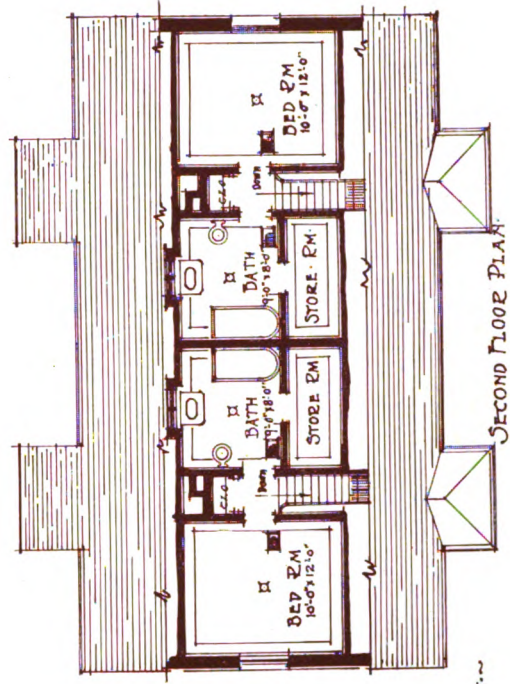
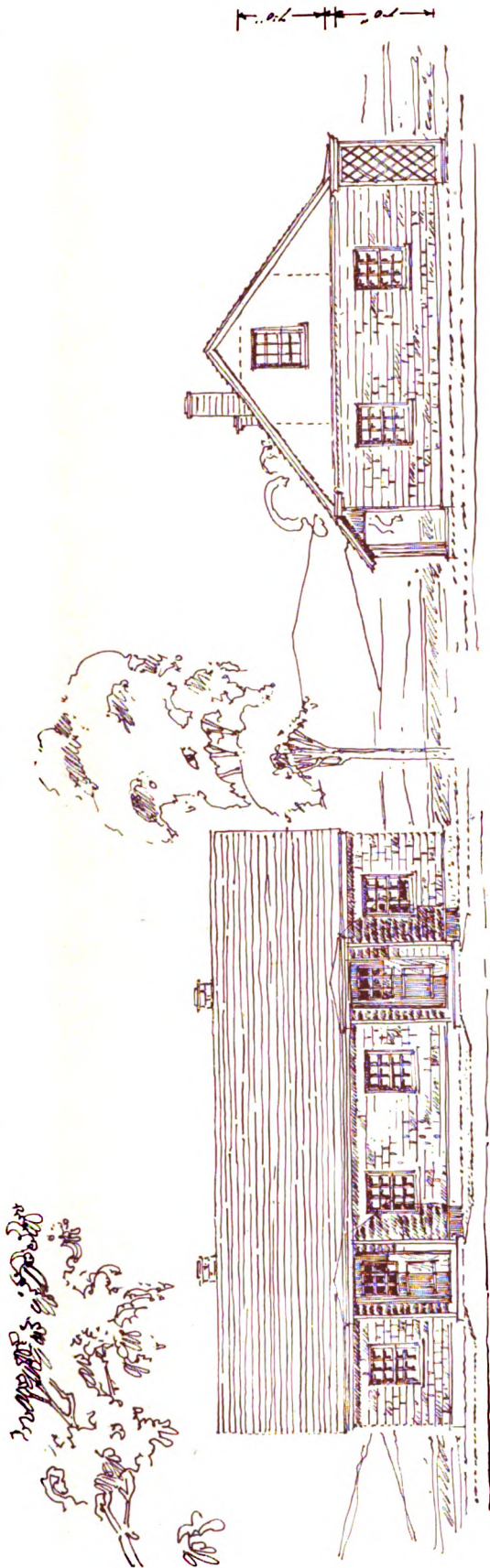


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CONSTRUCTION—SAFE HOMES

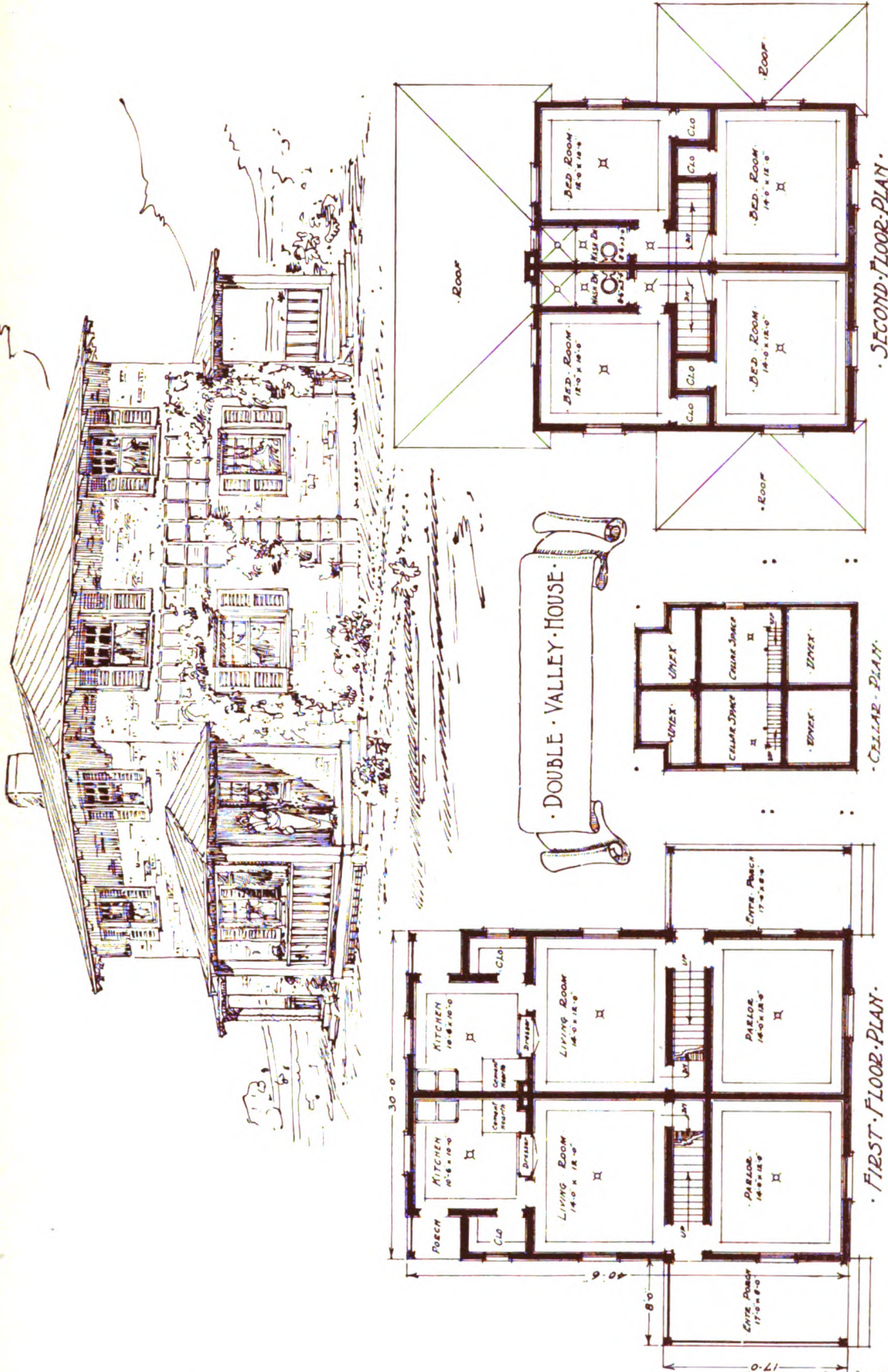


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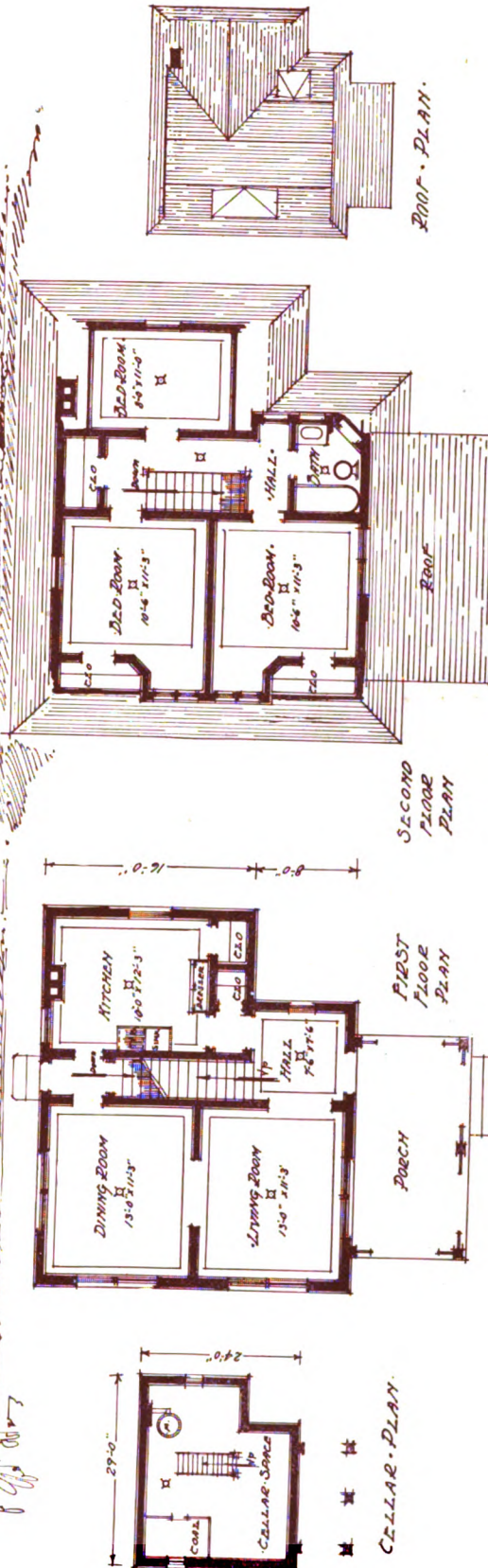
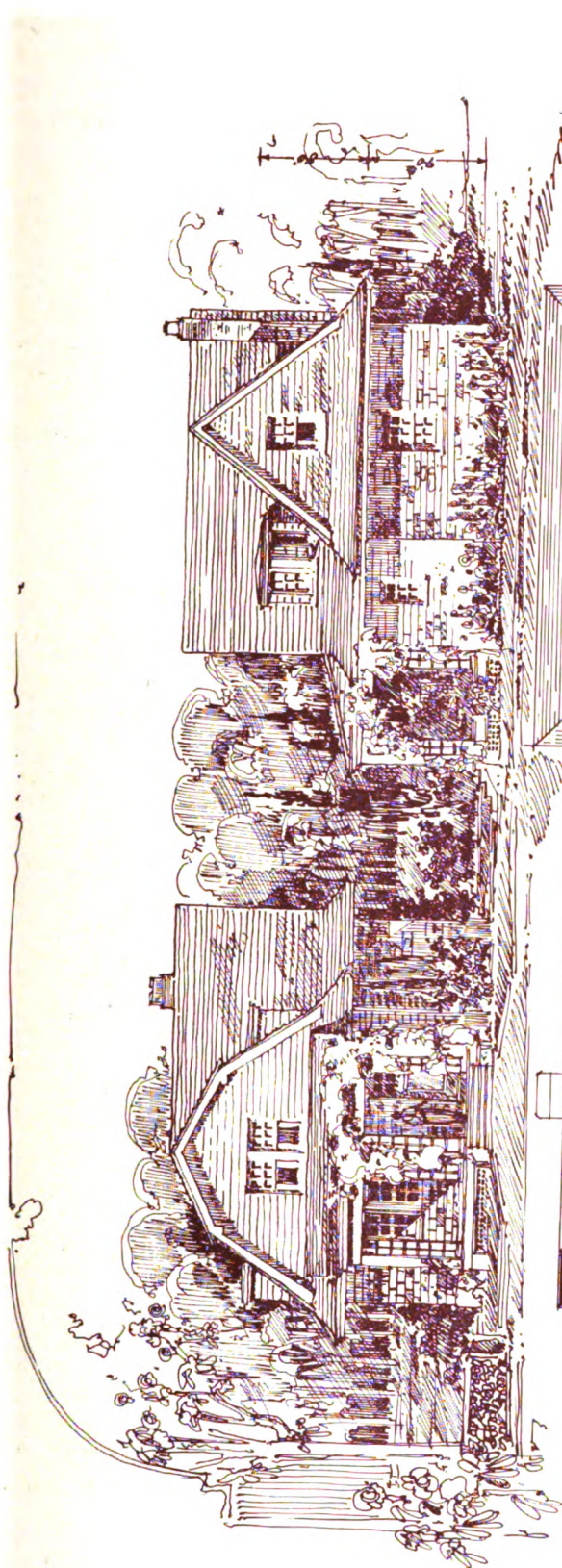
CONSTRUCTION—SAFE HOMES



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Supplement to CONSTRUCTION, New York City, December, 1915

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chusetts held that this proposal of the Homestead Commission was unconstitutional, but the objection has been overcome.

It is to be hoped that many states will follow the lead of Massachusetts, and that within the near future the agitation of housing question will result in nation-wide interest in the construction of industrial and garden villages.

In every man exist germs of thrift and morality. Every man at times feels the upward thrust of ambition. Clearly, great benefit can be derived by properly housing the laboring classes and fostering and encouraging thrift, morality and ambition. Give the workman a home which he can sometimes call his own, let his surroundings be comfortable and attractive, and

there will be no more "floaters;" the pay-envelope will be opened in the home, not in the saloon. "Fixing up" around the house is an interesting diversion when there is something worth fixing! The result is normal eating, sleeping and sanitary conditions; balanced mentality; a desire to "get ahead" and, from the employers' standpoint, sound machinery produced under favorable conditions. This means profits.

We have shown clearly how this can be done in a practical manner and without the loss of a dollar. The result will be an industrial community from which the highest type of labor can be drawn, a force of men who work in sympathy with the employer, even as he is in sympathy with them, men in whom the true American spirit has been infused. Question yourself again, Mr. Manufacturer—who gains?



An Interesting Letter

Received by the editor of CONSTRUCTION from E. C. Kimbell, Publicity Manager of the Panama-Pacific Clay Products Association. The firesafe house at the Exposition has received a great deal of attention and aroused much interest.

It is an open question as to the decadence of American home life with particular reference to those of moderate means, by reason of the multiplicity of apartment buildings, especially in cities, tending to lessen the desire for privacy that may be secured only in the detached home dwelling.

This idea of decadence is shattered by the experience of the officials of the Panama-Pacific Clay Products Association in summing up the results of their exhibit at the International Exposition at San Francisco, a model, modern, fire-resistant two-story residence that occupies the space originally assigned to the State of Colorado.

The exhibit is a six-room home with sleeping porch, and the surroundings are made more attractive by reason of an enclosed garden and garage, all contributing to the homelike appearance.

The "Home" has an exterior of solid brick construction, and the partitions throughout are of hollow tile with hard plaster finish, and roof covered with burnt clay shingles as an outer safety protection, and to make the structure of more attraction the space in the six rooms is so arranged that the requirements of the home worker are conserved. There is no waste room in the entire scheme, and that this feature is recognized as fully as the fireproofing features is proven by the universal interest shown by our visitors, as from the morning of September 10 to this date, 68,057 have passed through the "Home," and have been advised as much as a six-hour per day talk could advise them as to the advantages of "Safe Construction." As to the results, inquiries are now being received from all sections of the country not only as to the particular type of architecture shown by the "Home," but for other types and designs, bungalows and more moderate cost homes, but all of "Safe Construction."

Moderate cost plans and specifications are wanted, information as to comparative costs as between frame, hollow tile and brick, together with more definite information as to cement construction which would assure safety in the home investment, and all opening the way for a comprehensive system of publicity that would be nation-wide in its utility and of untold value to the manufacturing interests providing the same business acumen is applied by them in advertising on rational lines as is shown in perfecting their product to the selling point.

This condition leads to the query, "What is now being done to remedy the situation?" This is easily answered. In their efforts to promote the increased use of their products, the interests are "over-trained." Every manufacturer in the country, together with the principal dealers in every distributing center, is called upon to support a so-called general publicity movement. This is in addition to the state and local associations that of necessity must be supported. It is also a fact that individual interests are held paramount to the interests of the whole. There is a lack of cohesion among interests that are effectual in arriving at the same results—namely, "Safe Construction."

It may be that your association, or rather the association of which

your publication is the official organ, has struck "the keynote," as the Society Advocating Fire Elimination has in its directory and advisory board representatives of interests heretofore decidedly antagonistic, and the experience of the few who at their personal cost have made it possible to get at the "pulse" of the prospective home owner by reason of the expense incurred at San Francisco, may be of future benefit, but, like all matters of this nature, it devolves upon the few to demonstrate for the whole, in what manner they can best earn dividends.

Under the original plans of the directors of this association, the "Brick Home" was to have been furnished complete, and used as a general rendezvous for visiting clay workers, together with architects and contractors, and had the financial conditions of the interests warranted this would have been an attractive and valuable feature, but, unfortunately, upon a comparatively few was placed the burden of completion and bare maintenance of the exhibit, with practically no means to properly present to the visitors the necessary printed matter of educational value such as was called for daily.

Early in July the "Home" was furnished and occupied by Louise Brigham, originator of "Box Furniture," and used jointly by Miss Brigham and our association. This was our only alternative, and while the deal was entirely at variance with our original plan, it still had its purpose, as it caused an attendance that we would not have had, owing to our late start, and I find that the visitors, especially among the women, are fully as interested in what our exhibit stands for as they are in the furnishings.

Now as to my comments as to my experience and with those interested, I feel that I am competent to give an unbiased opinion of the general situation. As to the value of that opinion, it is for those with their money invested to decide.

I believe that the average manufacturer and dealer is waking up to the fact that the multiplying of so-called publicity movements, with no weeding out of those now in existence, is not a cure.

I feel that the time will come when the subscriber to one general publicity fund will procure the maximum of publicity at the minimum of expense. The initial start will be with the manufacturers and dealers in every town in the United States as active members, with reputable, progressive architects as associate members.

Building conditions vary with the location. Meet those conditions. If brick construction is prohibitive, pave the way for other fire-resistant material. In my work since September 9 in answering questions to the best of my ability, and learning of the interest that is seemingly universal as to how a home in particular can be built safe, I feel that the way is open to be worked successfully providing self-interest can be eliminated and the interests of the whole conserved.

Speaking before the latest gathering of the New York State Firemen's Association, at Oneida, Secretary of State Hugo, after emphasizing the abnormal fire loss of the country, urged the adoption of modern building laws and the frequent inspection of risks.

Wood Not Favored in Berlin

One of the primary reasons for the strikingly low fire record of Berlin, Germany, according to United States Consul-General Robert P. Skinner, "is the small quantity of wood used for structural purposes."

The Roofing of Large Buildings

A Description of the Various Types of Good Roofing and Their Fire-Resistive Qualities

AN all-important factor in the consistent construction of firesafe buildings is that of the proper roofing of large areas—a problem to which little study is given by many of those who plan the construction of industrial and public buildings, schools, theatres, apartment houses and other large buildings.

When specifications for a building are being drawn up and the roofing question is under consideration there are two subjects which, above all others, are important—those of fireproofing and waterproofing. Any roof which is designed to be properly fire-retardant and leakproof will almost invariably possess the inherent quality of durability, leaving as the only other consideration that of first cost and maintenance.

Many buildings in which fires have occurred or in which leaking roofs have caused damage testify to the fact that safety and practicability have often been sacrificed to artistic treatment. Wood shingles, which when properly applied undoubtedly satisfy the æsthetic sense, have proven a grave fire menace, and their use will soon be a forgotten practice unless some practical method of rendering them fire-resistive is evolved.

In the use of tile and slate the roof-pitch must be taken into consideration. A recent case before, the

public eye is that of a great public building which was roofed with shingles which could not be drawn down tightly enough to prevent lodging of snow, and this subsequently melted, then froze and lifted the shingles sufficiently to cause severe leakage.

On large buildings of a permanent nature light roofings which must be often renewed or refinished impose a greater ultimate cost, and, from the standpoint of fireproofing, are unsafe.

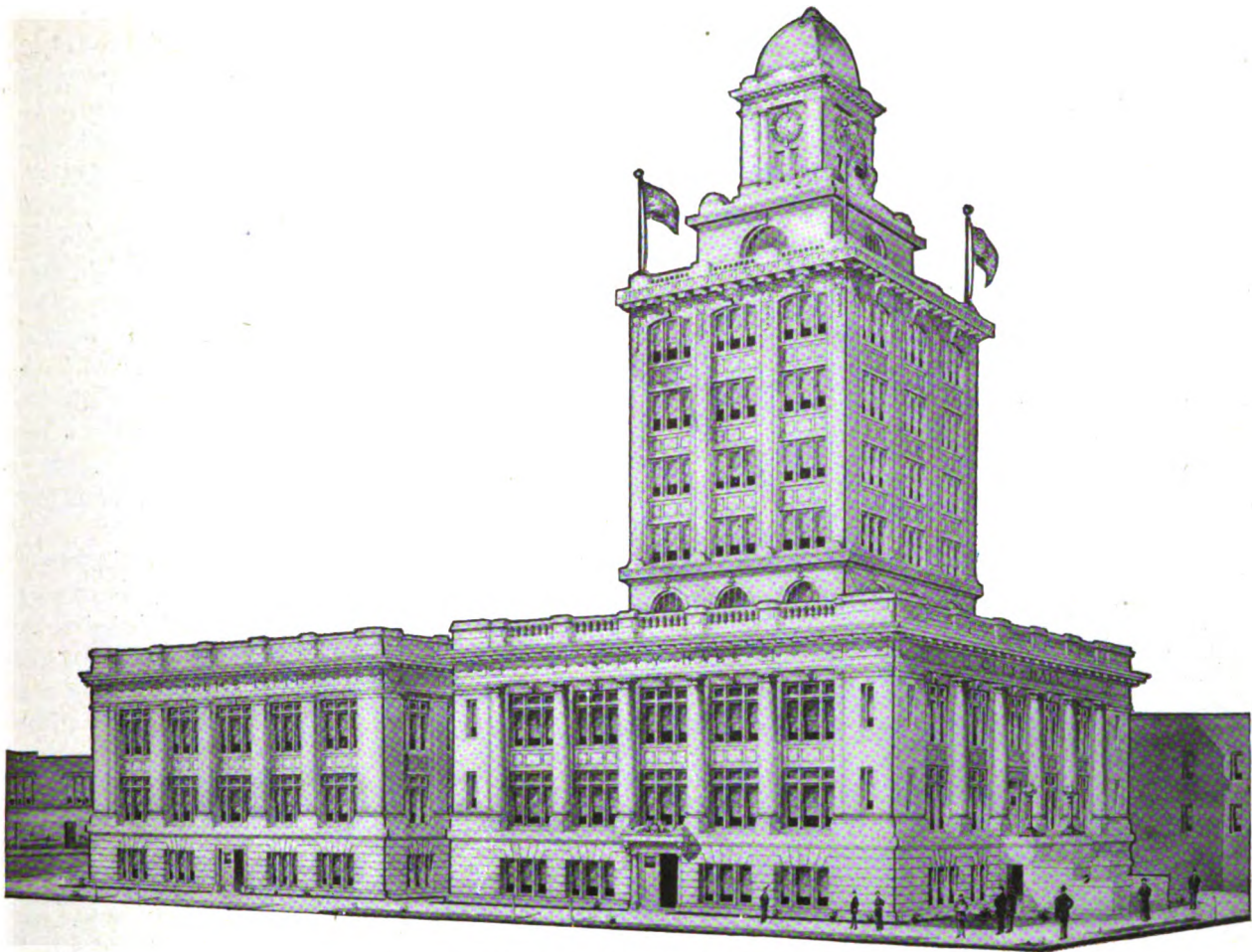
When choosing a roofing the exact conditions and requirements of service must be carefully thought out. What are the local conditions? Are there prevailing high winds? What will be the effect of snow? Is the building of a temporary or permanent nature? If the roof is to be other than flat, which of the many types of good roofing on the market will best lend itself to artistic treatment, considering always the questions of fire and water-proofness? Will there be other wear than that of the elements?

In the question of cost, cheapness should not be of first consideration. It is much better to figure the ultimate cost over a period of years. To the first cost add that of maintenance. Does the roof need constant repainting or refinishing? Is there any insurance reduction where incombustible roof deck is used? What



THE STATE SANATORIUM FOR TUBERCULOSIS, CRESSON, PA.

Asbestos shingles and asbestos lumber were used in its construction



CITY HALL AT TAMPA, FLA.

Architect, Bonfoey & Elliott. Barrett Specification Roof

will the roof have cost at the end of ten years—twenty years?

Fireproofing and waterproofing are component parts of the ultimate cost. A careful study of the conflagration hazard should be made and the blanketing effect of the roof in case of fire in the building should be considered. A roof which will hold in a fire for a reasonable period of time not only safeguards adjoining buildings, but checks the fire and proves of direct aid in the work of the fire department. Many cases are on record where tight and heavy roofings have so confined interior fires that the department has been able to isolate and extinguish the flames.

The various substances used in the manufacture of roofings are: Bituminous substances applied with felts made of rags, asbestos or jute and surfaced with crushed stone or slate; under this classification come the built-up and ready roofings; *clay*, which comes in the form of tiles; *cement*, also in the form of tiles, sometimes combined with asbestos; *concrete*, which is built up with various types of patented steel reinforcing and surfaced with waterproofing; *slate*, in the form of

slate shingles; and *metals*, which come in the form of shingles or, in the case of tin, in sheets.

One of the most exhaustive studies of the roofing question ever made was that of the Committee on Buildings of the American Railway Engineering Association, and these findings and opinions, coming from large users of roofings, should be of particular value to those interested in the subject. The report is in part as follows:

Bituminous Materials.—As used for built-up and ready roofings:

The common bituminous materials are: Coal-tar pitch (the heavier distillates of bituminous coal); various asphalts (bitumens found naturally in the solid state); various petroleum products; and various animal and vegetable residues. Their peculiar value lies in the fact that they are practically insoluble in water, and that they are elastic, adhesive, and comparatively stable.

Coal-tar pitch is easily affected by heat and cold, is not acted upon at all by water, is easily worked, and,

if properly protected, is very stable. It should ordinarily be used as it comes from the still "straight run," of a consistency suitable to the climate and to proper application. Water-gas tar pitch, a by-product in the manufacture of water gas, which is enriched by gas from petroleum oils, resembles coal tar. It is inferior to coal-tar pitch for roofing purposes, and materials made from it should only be accepted in the low-priced products. It has more value as a saturant of felts than as a coating.

The asphalts are unsuitable for use in their natural state. They are ordinarily fluxed with products of petroleum.

The petroleum products found in this country vary considerably, and grade roughly in quality, according to location from East to West. The California oils, with their asphaltic base, furnish materials especially valuable for roofing. The blowing of air through a heated still of certain petroleum products produces "blown oils," which, while somewhat lacking in adhesive properties, are not easily susceptible to atmospheric changes and are valuable especially for roofing coatings.

A single asphalt fluxed with a single oil is for most purposes a crude and unsatisfactory material. To secure the best results for any desired purpose, several oil and asphaltic substances must ordinarily be compounded. This requires skill and experience. Those properly made are for certain conditions invaluable, particularly for ready roofing, for which tar products are not suited.

The asphalt and petroleum products are not so readily affected by heat and cold as is coal-tar pitch, and lesser amounts of them are necessary to get good results. They are more expensive, require more skill in handling, and, when protected, some at least are to some extent liable to lose their life by drying out of the oil fluxes. Unprotected, they do much better than does coal tar.

These bituminous substances are used with felts whose qualities considerably affect the roofing. The ordinary felt is made of rags, mainly cotton. "Wool Felt" is a misnomer. Asbestos felts, as compared with the rag felt, act less as a carrying medium for the bitumens, but rather as a protection to the layers of bitumen. They are not suited for use with coal-tar pitch, but are not injured by hot asphalt. They are more expensive than rag felts, but have some peculiar and valuable qualities. Burlap made from jute decays easily when not protected. It is used in a few ready roofings, with rag felts, to increase their tensile strength, the need of which is not generally agreed to.

Built-Up Roofs.—The bituminous roofings come ready to lay, or can be built up on the roof, using layers of saturated felt mopped with pitch and properly protected.

The built-up roof is especially valuable for flat surfaces. It can be made as heavy as desired, and if

properly laid and of good materials it gives a roofing which by long experience has been shown to be economical and efficient. Where the roof is to be subjected to wear and where the character of the construction warrants the expense, flat tiles or bricks should be used as a protective coating to the roofing instead of gravel or slag.

For the flat roof built under average conditions, coal-tar pitch is recommended in preference to asphalt products. It is more easily handled, requiring less skill, and while more material is necessary it is still cheaper, and in our opinion more certain results can usually be expected from its use when laid by the average contractor. The large amount of material, although heavy, has an insulating value. Good results, however, can be expected from built-up roofs using good asphalt compounds where laid by skilled workmen.

When the slope of the roof is over 3 inches to the foot, the application of a built-up roof becomes more difficult for both coal-tar and asphalt, it being harder to get even mopping and there is more chance of accident for the men. The desirable straight run coal-tar pitch cannot be used, it being necessary to add some stiffening material, which is supposed to affect somewhat the life of the pitch. This must not be done except under supervision skilled in such work, and especial care must also be taken in the selection and application of the stone or slag coating.

Built-up roofs with a ready roofing for the coating sheet are proposed by various manufacturers. They should have their best value for steep slopes.

The advantages of a coal-tar pitch built-up roofing are such that it is recommended where a permanent roof is desired and where the character of the structure allows the building to be so designed as to allow its use. A flat roof makes an economical structure and has small fire hazard. A pitch of from $\frac{1}{2}$ inch to 1 inch to the foot is better than anything steeper. With proper materials and application a life of from 15 to 20 years can be expected with a flat roof.

No contracts should be made for a built-up roof without a complete and positive specification which includes flashings, and the contract prices should not be less than those of the materials specified plus a reasonable amount to cover the cost of laying and profit. Thorough inspection of workmanship and material is recommended.

Ready Roofing.—The ready roofing has better value for the steeper roofs than for those of small pitch. It averages much cheaper than the built-up types. Most kinds to get a fair life require occasional recoating. For flat slopes they are hard to lay absolutely tight, and they are not economical for a permanent structure, but on slopes of from 3 inches to the foot up their use is more justifiable.

Ready or prepared roofings are recommended for

use on small, temporary and other buildings, where the cost, considering maintenance, of more expensive roofings is not justified. They are also of value for steep slopes where a built-up coal tar cannot be used, and for locations where the skilled labor necessary for a built-up roof is not available. The steeper the slope the greater their relative value and the wider their economical field. The heavier varieties are in general

They would seem at least to be worthy of investigation.

Slate and Tile.—Slate makes a good roof if of good quality and properly watched. It breaks easily and cannot be walked on without danger to the slate.

Tile of good quality gives good results. It is not so tight as slate, but does not break easily. It has architectural value, and its use is growing, with im-



THE MONTANA APARTMENTS, 375 PARK AVE., N. Y. CITY

Rouse & Goldstone, Architects

Barrett Specification Roof

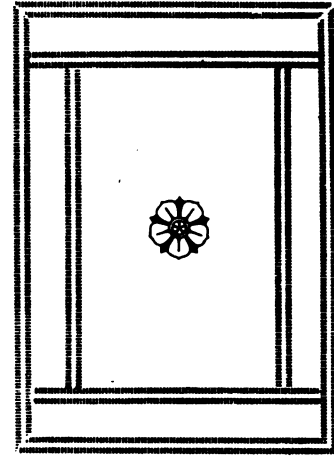
the more desirable because of their chance for longer life and their greater fire-resisting value. In making selections the reliability of the manufacturer, service tests and the cost should be governing factors.

On the steeper slopes the use of ready roofing shingles properly reinforced so as to prevent curling up at the corner and fraying on the exposed edges and laid shingle-fashion is growing. They are supposed to give better results than the rolled goods, but cost more.

provement in the product and in the variety of colors.

Slate and tile of suitable quality, properly protected and fastened, can be recommended on roofs with a pitch of 6 inches to the foot or over, where expense is not the governing feature and where they aid in producing the desired architectural effect, except that where there is much chance of driving snow 8 inches to the foot should be the flattest slope allowed.

Asbestos Shingles.—Shingles of asbestos and Port-



Interior and exterior views of building after severe fire, showing blanketing effect of good tin roof

Roofing by N. & G. Taylor Company,
Philadelphia, Pa.



land cement are of value. They have some elasticity and can be drawn down tight.

Wood Shingles.—Wood shingles are not now desirable for a railroad structure.

Cement Tile.—Small cement tile are not considered of much value, being brittle. Large cement tiles reinforced, laid without sheathing directly on the purlins, are in use on shops and freight houses, and seem to have considerable merit. Glass can be introduced into them, thus avoiding the expense of skylights. We are not ready to recommend them for plastered or heating buildings or offices where an occasional slight leak would be disastrous.

Metal Roofings.—Metallic roofings with steel as a base are not recommended for general use on permanent buildings. They require continual maintenance.

Galvanizing of steel seems to be well worth the expense. Tests of lead-covered steel sheets indicate good results. Large sheets of corrugated galvanized steel can sometimes be used economically where the building is not to be heated.

Small metallic shingles of either copper, tin, galvanized steel plate or specially pure iron are not recommended for general use. They are very light in weight and serve a purpose, particularly in the dry climate of the Southwest.

In using metals, every effort should be made to secure those of good quality. The pure irons have value. Their virtues have perhaps been overstated, but they are not expensive, and experience seems to indicate considerable economy by their use as a substitute for wrought iron and steel.

Copper, lead, zinc and Monel metal are used for roofing, but they are not of value for ordinary railroad structures.

Fireproofing Qualities

The study of the various roofings from the fireproofing standpoint is of exceeding interest and value.

Tin Roofing is incombustible and has a certain value as a blanketing medium. The illustrations shown herewith are interesting from the fireproofing standpoint.



Laying corrugated asbestos roofing

If an additional precaution against fire is desired, cover the sheathing-boards first with asbestos paper weighing not less than ten pounds to the square, and over this lay one thickness of deadening felt of the same weight.

Tin roofing must be painted, and with a good paint, to preserve it. Tin roofings can be shown which have lasted twenty or thirty years on railroad structures, but the danger of securing poor material and the cost

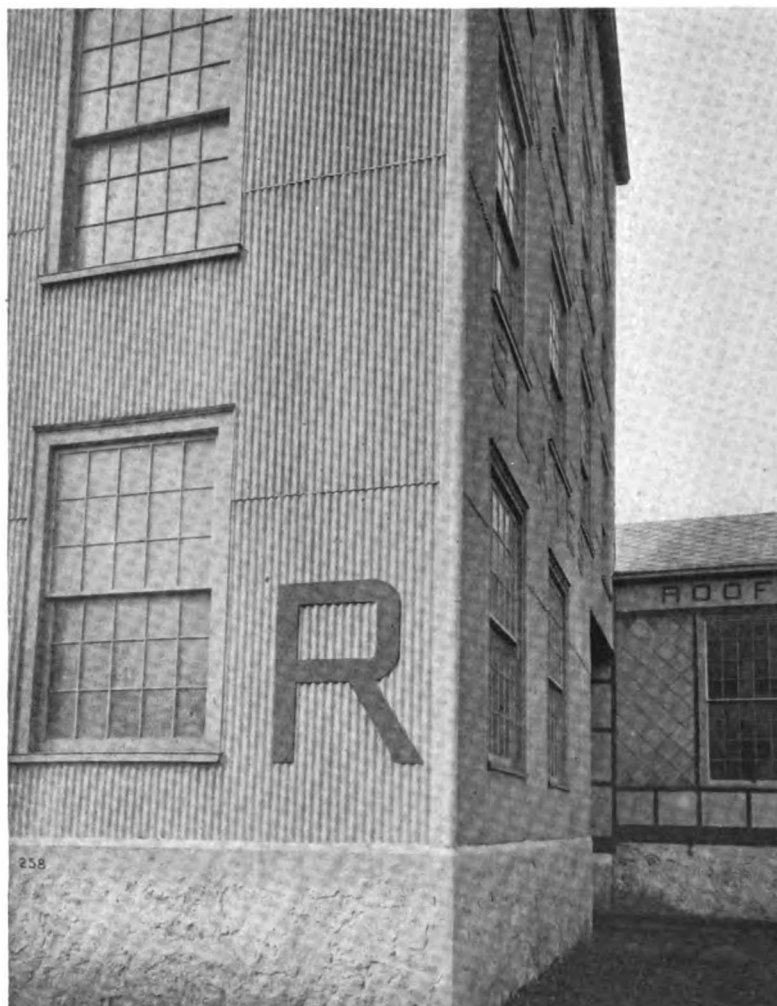
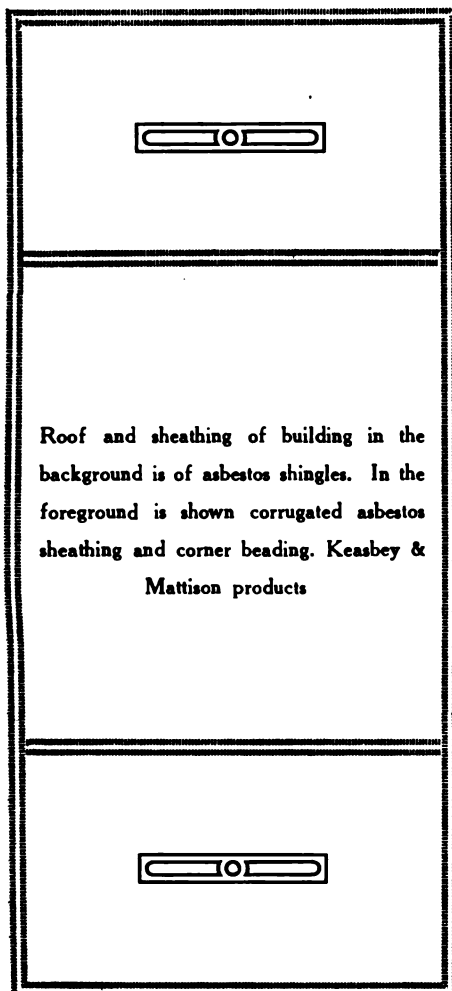
of maintenance have made conservative builders very cautious in its use. It has the great advantage of being available for all slopes, and it is adaptable to special and difficult conditions.

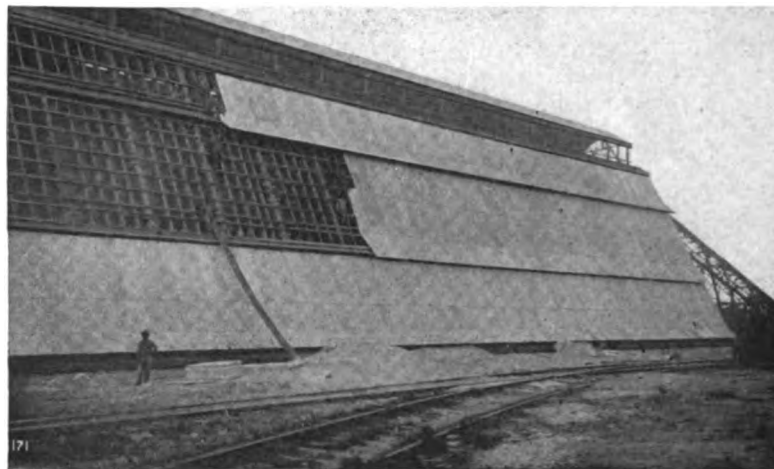
Plates for tin roofing should be prepared in the shop, and one side for use next to the sheathing given a coat of good paint. In soldering these sheets, rosin, and not acid, should be used, as the latter may find an opening in the tin coat and attack and destroy the body.

Where tin plate is used for roofing it should be with flat seam secret nailing for flat or less than eighth pitch roofs. For those of greater pitch than this a standing seam secret nailing may be used, care being taken that seam is not carried into the gutter, where it would interfere with drainage and also be a possible cause of leaks through water making its way into the seams. The tin strips for this should be painted before application.

Slate Roofing is absolutely unburnable and makes an excellent roof if properly applied (proper application of slate was described in November issue of CONSTRUCTION, in the article, "The Menace of the Wood Shingle Roof").

Clay tile is absolutely fire-resisting, but will, of





Applying corrugated asbestos roofing

course, collapse when the supporting members are weakened by fire. If properly designed to exclude the elements it is a good roofing material, excellently adapted to artistic treatment.

Cement tile, similarly, is fire-resistive. An excellent type of roof covering is large reinforced cement tile laid directly on steel channel purlins. Over a million feet of this roofing was used by the Government at Panama.

Concrete.—An excellent type of unburnable roof has been developed within recent years, using protected metal and concrete with steel reinforcing. This roofing, as shown in the accompanying sketch, consists of three essential elements:

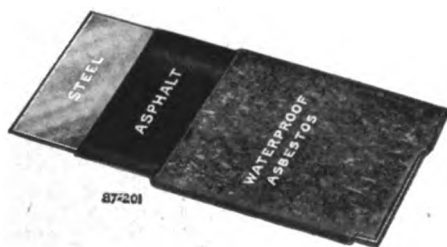
1—Asbestos Protected Metal, which serves as the

faced with asphalt and asbestos felt as a protection against rust or corrosion. This makes an excellent roof.

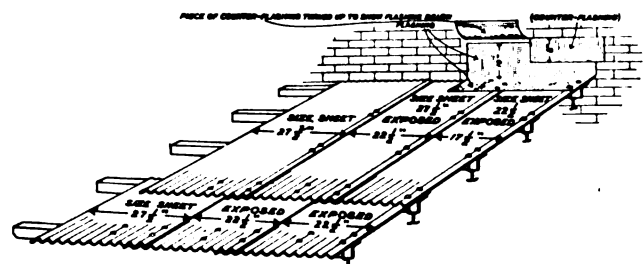
Another interesting type of concrete roof which can be constructed without the use of forms is that in which Self-Sentering, manufactured by the General Fire-proofing Company, of Youngstown, Ohio, is used for reinforcing.

Photographs herewith show the construction of such roofs. In this construction the roof thickness is only two inches, but tests have shown that loads in excess of roofing requirements can be safely carried.

Concrete construction, using various patented reinforcing materials and doing away with the cost of forms has done much to advance the popularity of the



Asbestos protected metal



Application of Self-Sentering

self-centering form for the concrete covering, as the finished ceiling, requiring no under-side plastering, and as strength-contributing member of the construction.

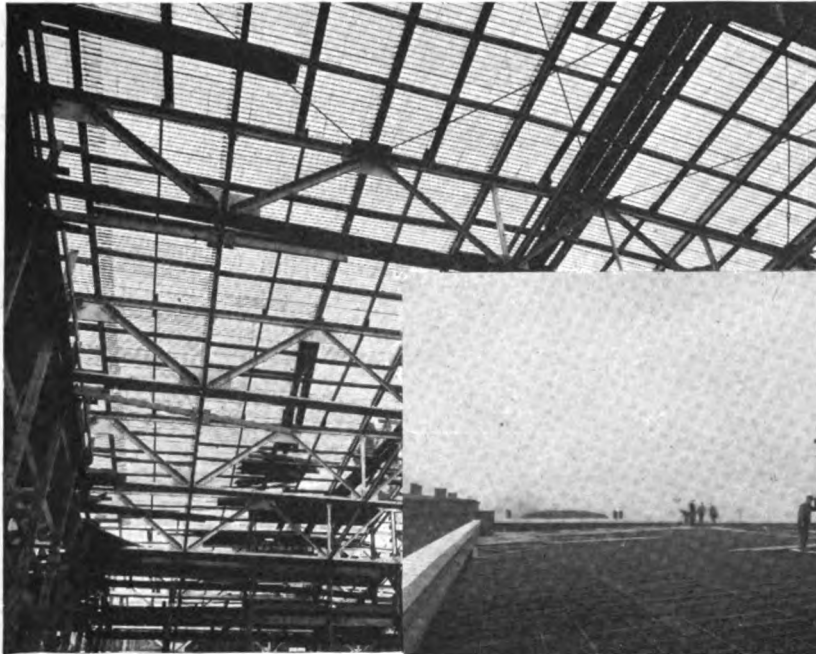
2—Concrete, which fills and strengthens the corrugations, distributes the load and provides a suitable surface for the application of waterproofing.

3—Steel reinforcement to provide additional strength to that afforded by the protected metal in cases of heavy loads.

The protected metal referred to is sheet-steel sur-

face with asphalt and asbestos felt as a protection against rust or corrosion. This makes an excellent roof. The fact that such construction allows of the use of concrete for pitched roofs, domes, and sawtooth roofs, as well as flat, allows a diversity of roof construction which has considerable architectural value.

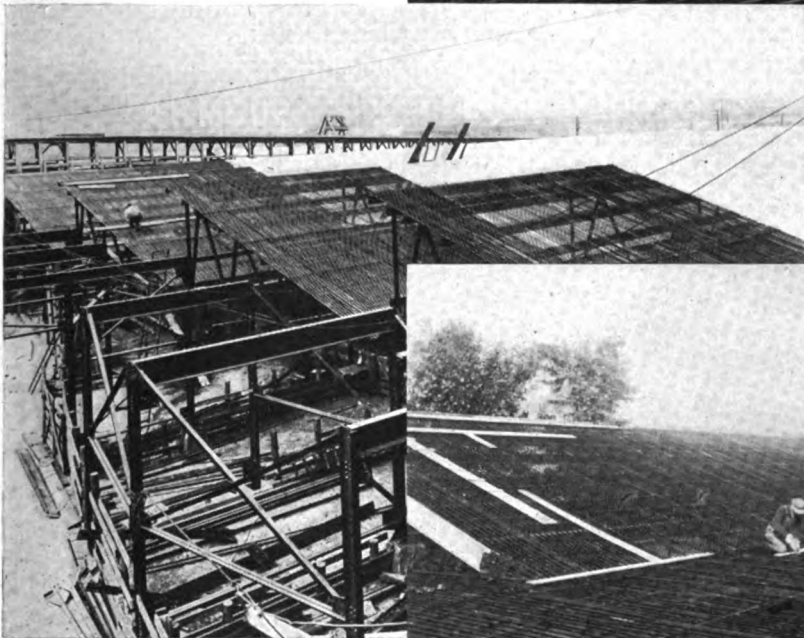
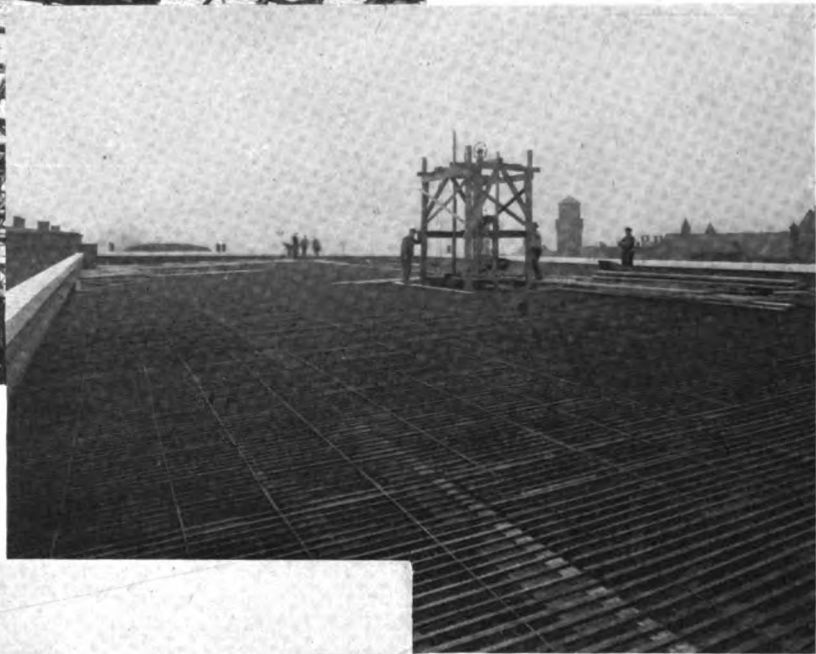
Another interesting application of cement in roof construction, is its combination with asbestos in the form of shingles and corrugated sheets. The ingredients in this roofing, as manufactured by the Keasbey & Mattison Company, of Ambler, Pa., are subjected to



Cleveland High-Pressure Pumping Station

View from interior, showing Self-Sentering construction for roof

Self-Sentering roof ready for concrete

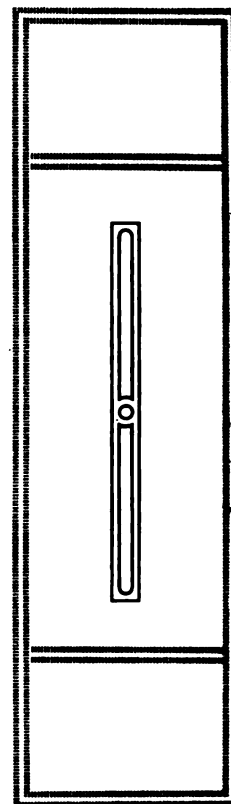


Frost Wire Fence Building, Cleveland, Ohio

Laying Self-Sentering reinforcing for concrete roof



Union Stock Yards, Omaha, Neb.
71,050 square feet of Self-Sentering on sawtooth roof



Interior of building, showing an expanse of asbestos-steel ceiling

a long beating with water in a beater engine until a colloidal state is obtained in which the solids do not settle out. It then passes to the vat of a paper machine, from which it is picked up in thin layers, which are built up to the required thickness to form sheets. The latter are then laid between corrugated forms and subjected to a pressure of 80 to 90 tons per square foot.

This process of manufacture insures that the asbestos fibres shall each individually be coated with cement, that they shall be uniformly distributed and matted to-

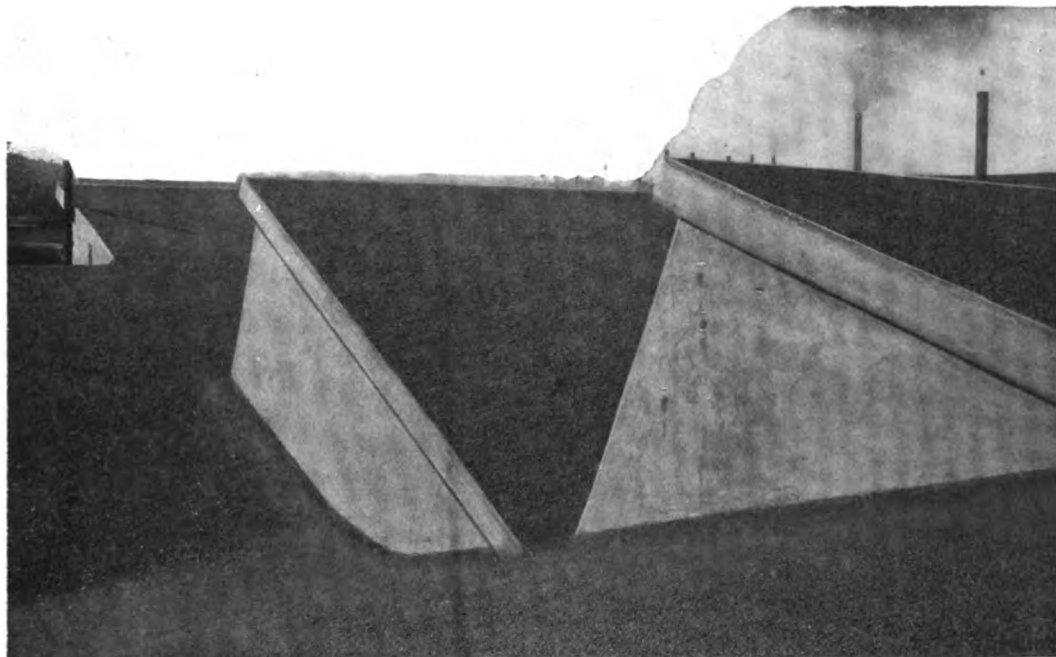
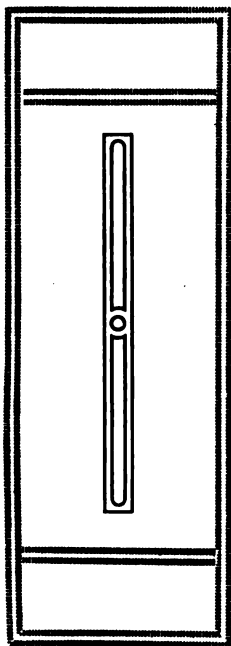
gether, and that there shall be no voids or fissures. The result is a tough, resilient texture, in which the asbestos fibres and cement crystals are intimately interlaced, thereby utilizing the tensile strength of the asbestos as reinforcement to the cement.

Asbestos and cement shingles also have value for use in the roofing of large buildings and lend themselves to artistic treatment, as they can be laid in several designs and come in colors.

The fireproofing qualities of this combination of asbestos and Portland cement are obviously excellent,



Asbestos-steel slab on channel purlins, indicating the relative location of the A P M rectangular corrugated sheet, concrete, reinforcing rods and waterproofing



Finished appearance of asbestos-steel roof and walls—sawtooth construction

and experience has shown that its use in the form of corrugated roofing, shingles, fireproof and building lumber is economical and satisfactory.

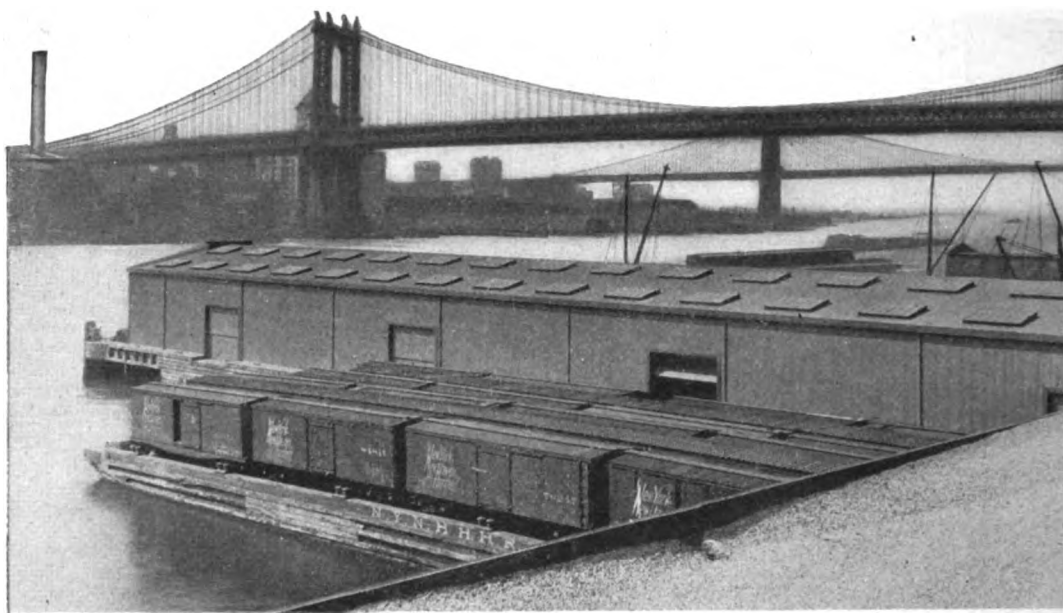
Built-Up and Ready Roofings.—The built-up roof has considerable value, not only being practically conflagration-proof, but serving well as a blanket because

of its weight. The report of tests by the Underwriters' Laboratories on the Barrett Specification Roof, a standard built-up roofing, detailed construction of which is shown herewith, offer the best proof of the value of built-up roofings.

Here the roof-covering for combustible roof-decks



Applying the cement plaster to asbestos-steel studless lath



Pier 37, N. Y., N. H. & H. R. R., East River, N. Y. C. 41,500 square feet of built-up roofing

consists of a layer of rosin-sized sheathing paper or dry felt next to the deck, two layers of tarred felt, a complete coating of pitch, three layers of tarred felt laid in pitch so that felt does not touch felt in any of the three layers, a heavy upper coating and a thick, non-combustible surface of gravel or slag.

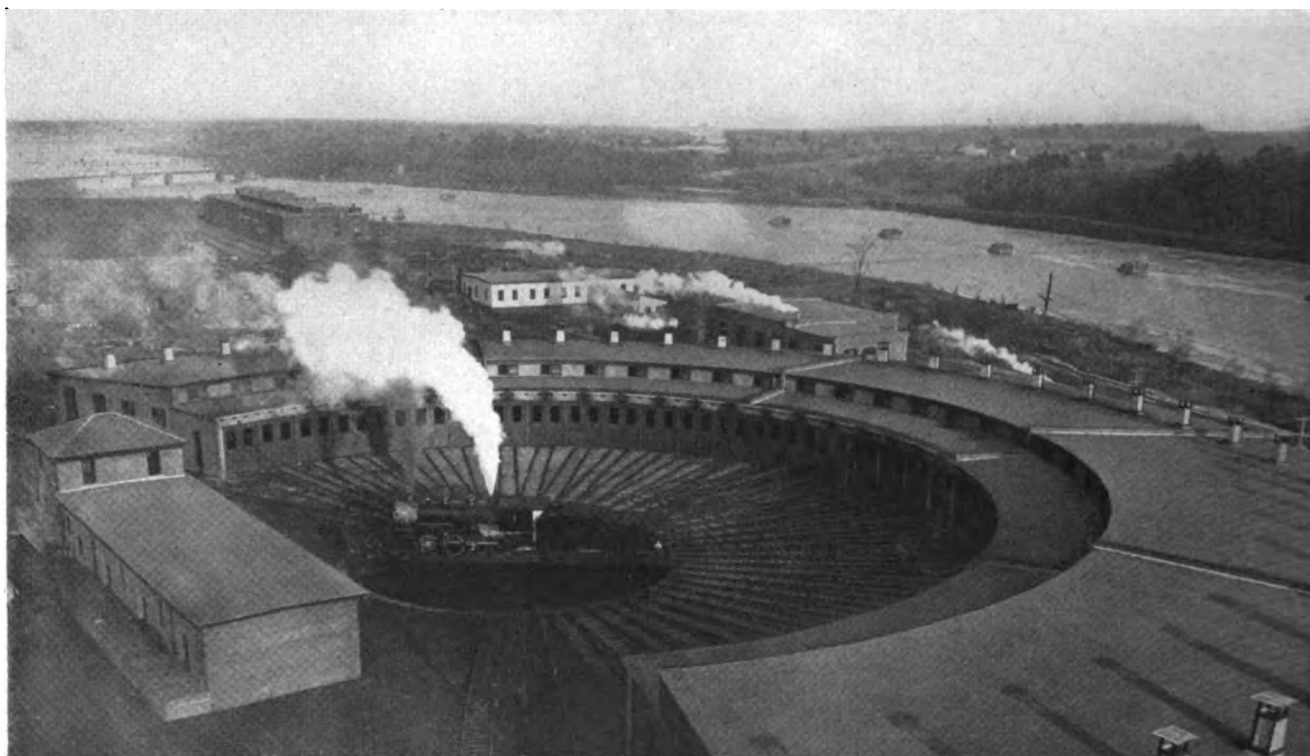
The roof covering for non-combustible roof decks consists of a coating of pitch on the deck, five layers of tarred felt laid in pitch so that felt does not touch felt

in any layer, and a thick, non-combustible surface of gravel or slag.

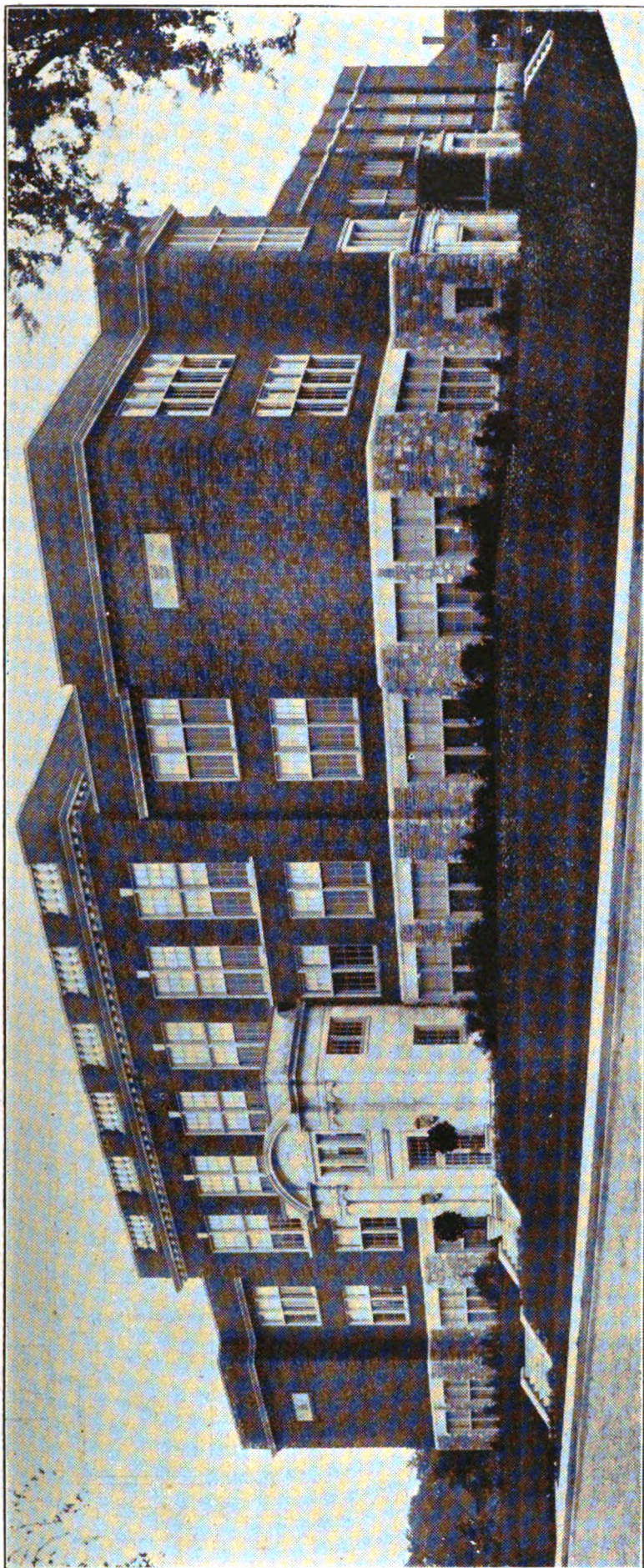
Exhaustive fire tests were made on these roof coverings for combustible decks, the surface coating being of gravel.

Following are the results:

Flammability.—The roof covering gave off small volumes of smoke and flammable gases within 2 min—
(Continued on page 178)



MAINE CENTRAL ROUNDHOUSE, WATERVILLE, ME.
General Contractors, Horace Purinton & Co., Barrett Specification Roof



Students Safeguarded Against Fire



Greenfield's Example —of Proper Schoolhouse Construction

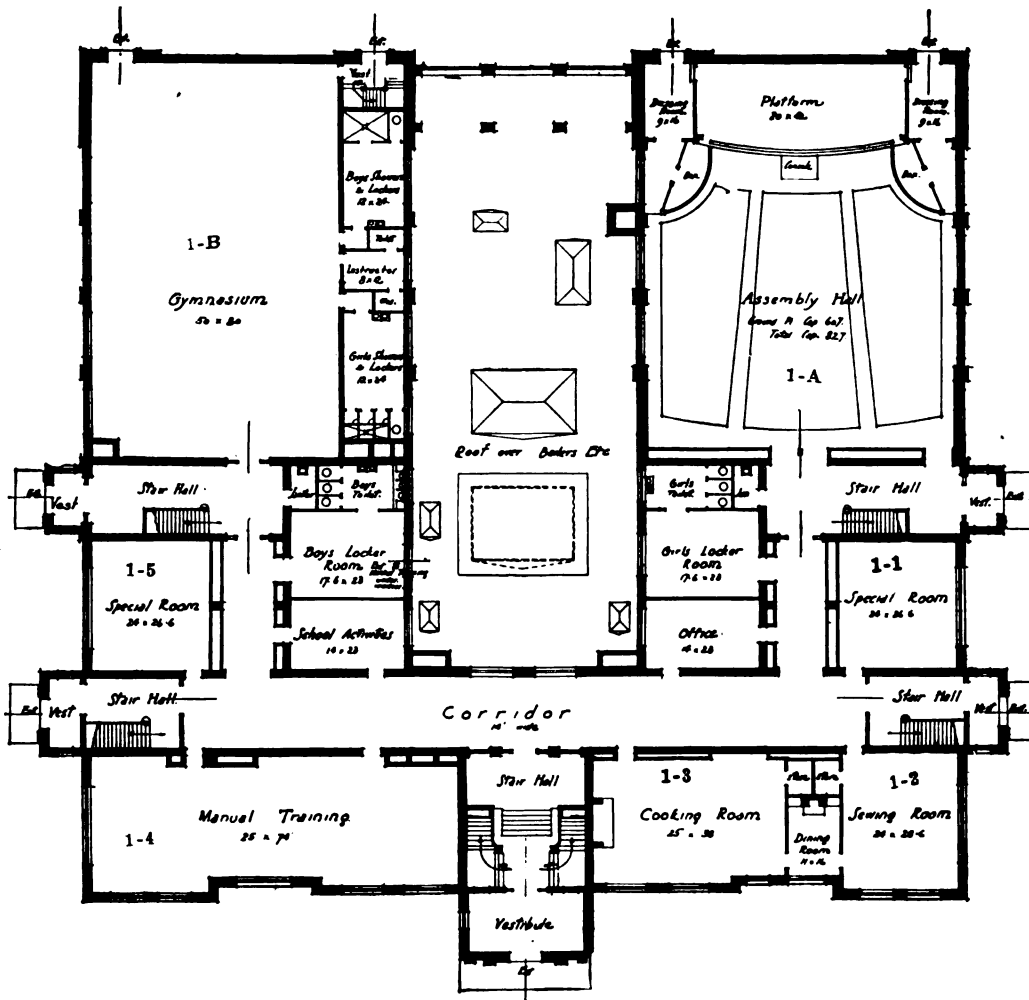
Edward L. McClain, the donor of this \$300,000 High-School, is to be commended on his insistence that safety as well as comfort of pupils be considered

IN view of the widespread agitation for greater safety in the construction of public schools that now exists throughout the country, the recent completion at Greenfield, Ohio, of a fire-proof building of this character is of especial interest, and CONSTRUCTION commends to architects, engineers and educators generally a carefully study of the plans of the structure, presented herewith.

Designed by W. B. Ittner, architect of the St. Louis Board of Education and a recognized authority on school building construction, the Greenfield High School referred to by Dr. Dressler, author of "American School Houses," as being a "model of its kind," is a basement and three full stories in height, and of "fire-proof construction throughout."

The base is of hammer-squared, random ashlar local stone; above the base the building is faced with matt finish brick in a full range of colors. Bedford stone is used to dignify the entrances and to mark the horizontal divisions, while the broad wall surfaces are relieved by beautiful pictorial panels in Moravian tile mosaic.

It is provided with a low-pressure sys-



First floor plan of Greenfield High School

tem of heating and ventilation, with temperature and humidity control. Locker rooms, lavatories and toilets are provided on every floor. All rooms are unilaterally lighted. A vacuum cleaning system is provided. In heating, lighting, ventilation, sanitation and provisions for safety this building marks the highest attainment, up to the present time, in school architecture.

In the methods of rapid access and egress the building is unexcelled. The main corridor is 14 feet wide and is well lighted throughout its entire length. The secondary corridors are 10 feet wide. Each stairway is enclosed in a polished metal and wire screen. There are ten exits from the building on the ground level. Five stairways of re-enforced concrete construction, properly distributed, give easy and convenient access to all parts of the building. The gymnasium and auditorium are so constructed that they may be used after school hours and during vacations without access to the main building.

The building is beautifully finished throughout. The floors are of hard maple laid on concrete, the finish in quarter oak, the window sills of slate. The finish in quarter oak, the window sills of glazed brick, the blackboards of slate. The walls are tinted

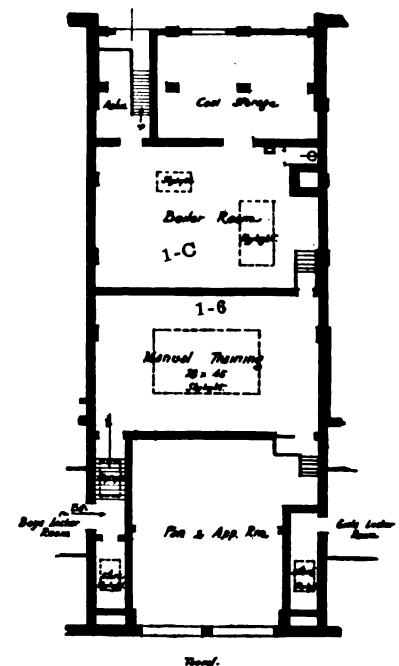
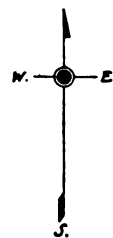
French gray. The stairways and main entrance are finished in marble.

The building contains:

1. An auditorium 63 feet 4 inches by 80 feet, with balcony. It will seat approximately 900 persons. The stage is 20 feet by 42 feet, with dressing rooms.

2. A gymnasium 63 feet 4 inches by 80 feet, with a clear floor space of 50 feet by 80 feet, and a clear height of 26 feet. Locker and shower rooms, as well as an instructor's room, are provided. A spectators' gallery will seat 250 persons.

3. A study hall 41 feet by 81 feet, with an extreme height of 20 feet to its paneled and beamed ceiling. It has a seating capa-



BASEMENT FLOOR PLAN
SCALE: 1/8" INCH = 1 FOOT

city of 250 at single desks.

4. A library with art metal stacks for 5,000 volumes.

5. A domestic science group of three rooms—a cooking laboratory, model dining room, and sewing room.

6. A manual training group of three rooms—a wood-working shop 25 by 74 feet, a metal-working shop 25 by 40 feet 6 inches, and a finishing room.

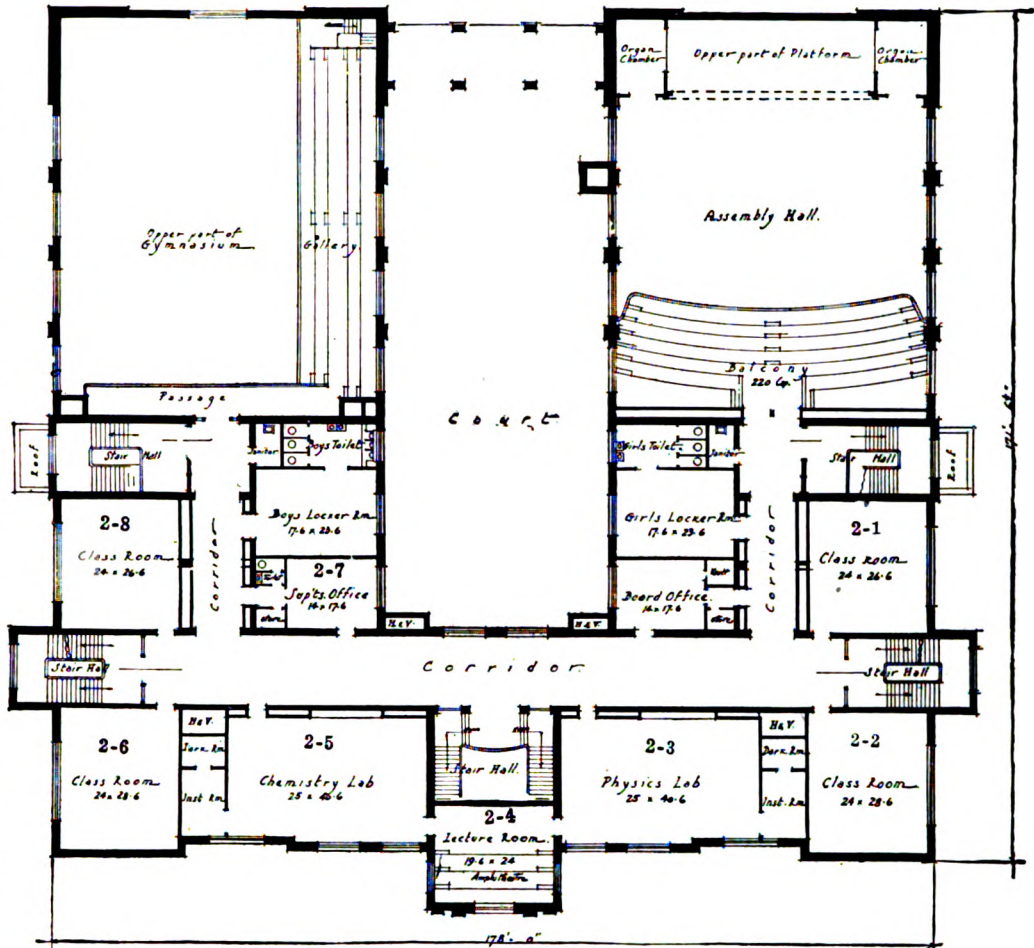
7. A science group, consisting of a chemical laboratory, 40 feet 6 inches by 25 feet, a physical laboratory of the same dimensions, a connecting lecture room, two instructors' rooms and two store rooms.

8. A commercial room 36 feet by 26 feet. A typewriting room 26 by 14 feet.

9. A Literary Society hall 36 feet 6 inches by 26 feet.

10. Eight standard recitation rooms, 24 feet by 28 feet 6 inches.

11. Offices for Superintendent, Principal and the Board.



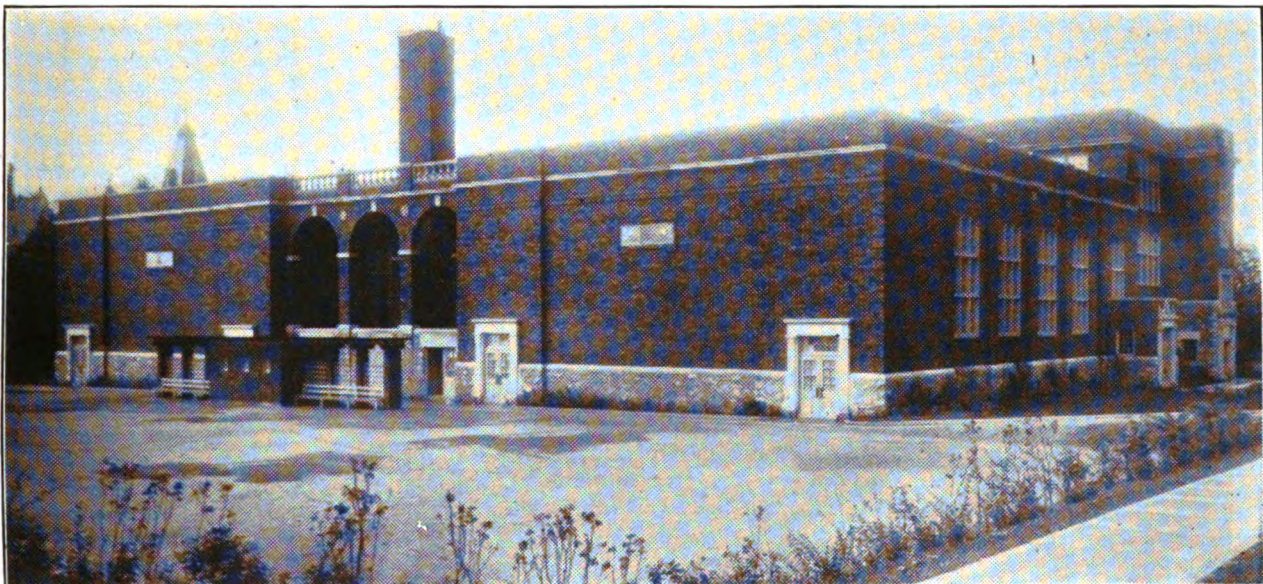
Second floor plan of Greenfield High School

12. Two rest rooms.

13. A room for school activities.

14. Eight locker rooms 23 feet by 17 feet 6 inches, with connecting toilets and lavatories, finished in enameled brick and marble.

15. Six janitors' closets. Several storage rooms.



Rear view of building, showing stadium and courts

16. Fan and ventilating room, boiler room, coal storage and engineer's workshop.

17. Two tile-paved terraces, each 63 by 93 feet, joined by a graceful arcaded bridge, designed for outdoor study, recreation, horticulture and agriculture.

Equipment

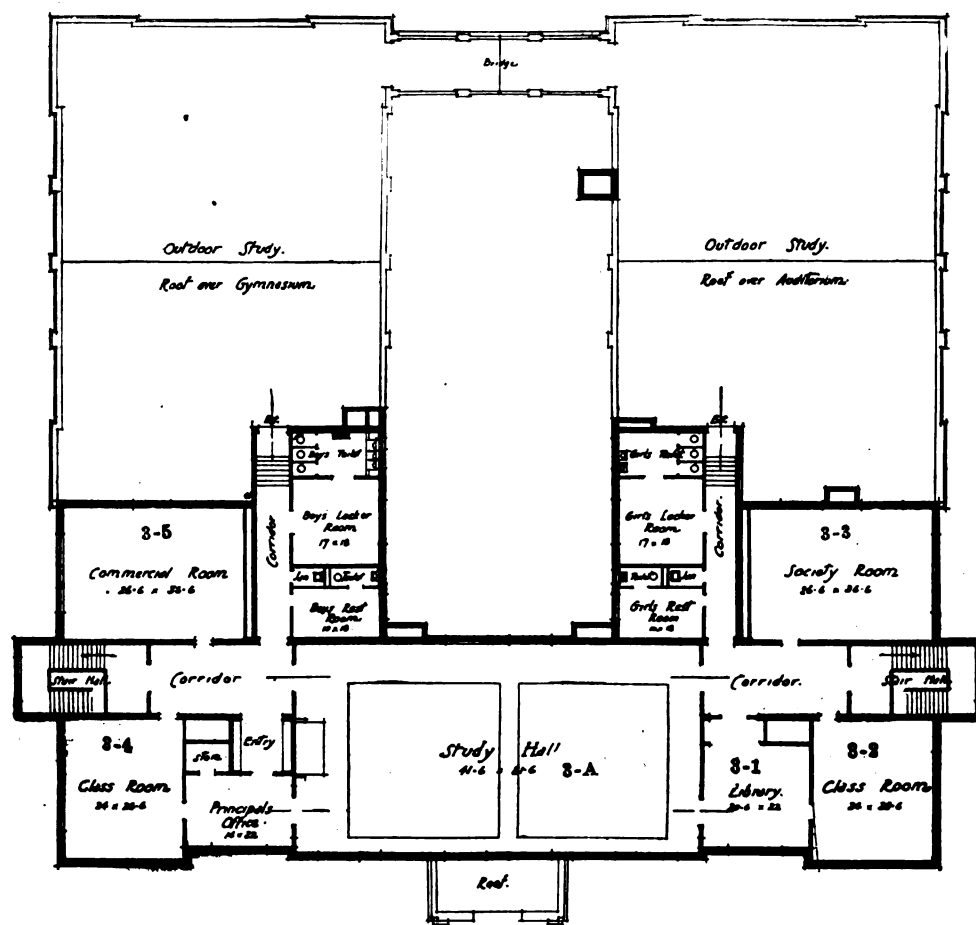
The equipment of the building is in keeping with its construction, all furniture being especially designed by Mr. Ittner, and thoroughly artistic as well as useful. The auditorium, seated with opera chairs, is pro-

Edward Lee McClain

The erection of the High School here described was made possible through the generosity of Edward Lee McClain, Greenfield's first citizen, and a man of whom all Americans may well be proud. It was he who conceived the idea of presenting the structure to his native city, aided in its planning and erection and defrayed every dollar of expense incurred thereby—\$300,000. Successful himself, Mr. McClain determined to do all within his power to aid in the advancement of his fellows, and wisely determined that this

could best be attained by providing superior educational facilities for the oncoming generations. To know something regarding the personality of one actuated by such a motive and able to carry it into effect is a natural curiosity and justifies ample space, even in a technical publication like CONSTRUCTION.

Of Scotch-Irish ancestry, and justly proud of the fact, Mr. McClain was born at Greenfield, Ohio, in 1861. He attended the local public schools, and when twenty years of age began the manufacture and sale of an improved horse collar pad, which he patented both in the United States and Canada. Starting in a small room and upon \$300 borrowed capital, the business developed to such proportions that in 1903 the American Pad & Textile Company was



Third floor plan

vided with a firesafe motion picture booth, having projection screen and apparatus. The aisles are covered with cork carpets.

The movement of classes is controlled by a program clock system, consisting of a self-winding master clock, with 23 secondary clocks. It also controls the hall gongs and fire alarms. Every part of the building is connected by an inter-communicating telephone system.

A gas-generating plant is maintained. For safety it is housed in a three-room building in the rear of the school. It is designed to supply the science and cooking laboratories with Blau gas. The equipment consists of cabinet, reducing valves, expansion tanks, etc.

formed with a paid-in capital of \$1,250,000 to take it over. Stock in the new corporation was, and is, wholly owned by Mr. McClain, his brother, A. E., and Charles Mains.

Versatile and energetic to an unusual degree, Mr. McClain became actively identified with other interests than that to which he owed his primary success. Twelve years ago, as head of the American Textile Company, he built and equipped near Cartersville, Ga., one of the largest and most modern cotton mills in the entire South. For the comfort of the employees a model village was created and has since been maintained upon desirable lines.

Other important business interests engaging the attention of Mr. McClain are the Crescent Manufacturing Company, of Louisville, and the Sand Mixing Machine Company, of New York City. The former corporation manufactures showcases and woodenware specialties, while the latter supplies builders' appliances.

Altogether, Mr. McClain is a many-sided man, taking a close and intelligent interest in the social and religious, as well as the business, life of his home city and State, and contributing generously of his means, as well as of his time, to both. That he enjoys to an unusual degree the esteem of his fellowmen is easily believed.

Speaking at the dedicatory services of the High School, Governor Willis of Ohio said in part:

"Whoever planned this building, whoever outlined the purchase of its equipment, knew what he was doing. This building exemplifies not only the best in school architecture, but in its equipment it exemplifies the best thought on educational lines in this country. The old system of Ohio has long held a leading place in educational affairs. When Ohio was organized and the provisions of the ordinance of 1787 were carried into effect that was the first time since the morning stars sang together that an educational institution was erected clearly upon public funds and supported by public income. And the beautiful thing about this splendid gift that has come to the good people of this beautiful village is the fact that I have learned that it comes with no conditions; that it comes without any strings tied to it; not to one sect, not to one race, but it is given to all the people without regard to conditions. That is the spirit of democratic

education and of republican institution in this country. And I congratulate myself that I have thus for a brief moment had the opportunity to express to you my abiding interest in this great cause, and to say in the presence of the donor that I think this is one of the most splendid acts that has ever been performed by any citizen of Ohio. The years will come and go; the boys and girls that are to be educated in these halls will pass on to higher and better things."



Edward Lee McClain, Donor of the Greenfield High School

Fire Endangers Entire Town

A further exhibition of the folly of housing water stations in frame buildings was afforded on the 10th ultimo, when the entire water service of Blackstone, Va., was put out of commission through the burning of the pump house. Originating in the mills of the

Blackstone Lumber and Manufacturing Company, the flames quickly spread to nearby structures, and for a time seriously threatened the whole community. The direct property loss will be about \$60,000, and that it does not greatly exceed that sum is attributed to a fortunate change of the direction of the wind.



View
of
Audit-
orium
looking
toward
stage

Greenfield
High School



View
of
Auditorium
from
stage

Greenfield
High School



The Proper Fireproofing of Structural Metal

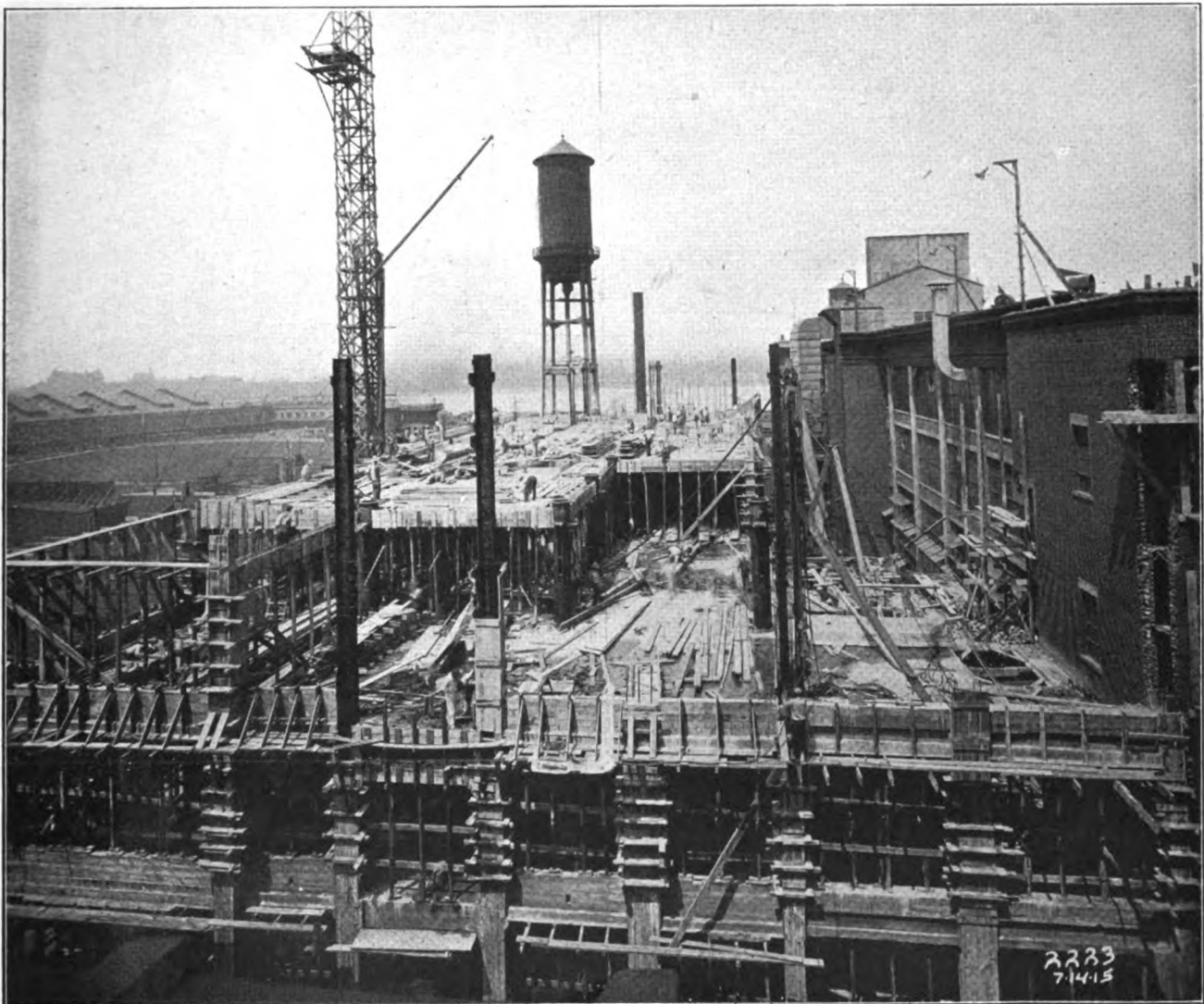
By Wm. Wallace Ewing, C. E.

Mr. Ewing is a member of the American Society of Civil Engineers and of the American Society for Testing Materials. In his former capacity of testing engineer in the Building Department of New York City and in large construction work which he has subsequently supervised, he has had occasion to become familiar with good practice in the important matter of fireproofing structural metal.—EDITOR.

THE development of the use of metal frames in building construction naturally led to a close study of the behavior of the metal members in fires. The practical lesson which was taught by the failure of unprotected members, due to the effect of heat, was that such members could not be used unless they were in some manner so protected from the heat of a fire

that they would serve to support the structure during the most severe contents fires.

During the years of development it was found that structural members of cast or wrought iron were not as satisfactory as steel and in the present-day construction metal framework of buildings is almost invariably of steel. It is of particular interest, then, to consider



Applying concrete protection at the plant of the Victor Machine Company, Camden, N. J.



Placing hollow tile for beam and girder protection in Equitable Building, New York City

present practice in the matter of fireproofing the steel frame in order to prevent failure.

Tests have shown that steel is first affected by heat at about 500 degrees Fahrenheit, and that at 1,100 degrees steel members under ordinary building loads commence to fail.

Accepting as a known fact that steel must be fireproofed, the important questions are—what materials will best serve the purpose and how shall they be applied?

Experience has shown that burned clay products such as hollow tile (terra cotta) and brick, and concrete properly mixed and placed, constitute the best protection for metal structural members.

An interesting comparison, and one which must necessarily bring out many points of value, is that of the building code recommended by the National Board of Fire Underwriters and the new building code of New York City as they relate to the subject of fireproofing structural metal. Each is the result of long and careful study and investigation and properly represents present practice.

Wall Columns

New York Code: Iron or steel columns placed within exterior walls or along the outer lines of a building shall be encased with approved masonry not less than eight inches thick on their outer and side surfaces nor less than four inches thick on their inner surfaces.

Fire Underwriters' Code: All columns which support steel girders carrying exterior walls, and all columns which are built into walls and support floors only, shall be protected against corrosion by a coating of Portland cement mortar at least one-fourth inch thick, and against moisture and fire by a casing of masonry which shall be not less than four inches of brick or three inches of concrete on all sides; all to be well bonded

into the masonry of the enclosing walls. This code also discourages the use of stonework for protective purposes, owing to its liability to spalling in fire.

Here we find the New York Code calling for thicker protection than the general code of the Underwriters, which condition is partially due to disastrous experience in New York fires in large buildings, particularly quick, hot fires which have originated in small adjoining buildings and affected structural metal in the walls of the large buildings. There is no doubt that this is an excellent precaution where severe neighboring hazards exist. On the other hand, the Underwriters' Code calls for a most excellent protective measure in the surfacing of columns with a quarter-inch coat of cement mortar as a protection against the ever-present danger of rust and corrosion, which weaken metal parts.

In the matter of the protection of interior columns the Codes differ, the Underwriters calling for three-inch protection and New York for two inches. Both allow lugs and brackets to project within an inch of the surface of the fireproofing. The question of just what constitutes an efficient protection for columns is a much mooted one, and an important decision awaits the results of investigations now under way at the Underwriters Laboratories in Chicago. It would seem that under ordinary conditions a properly applied two-inch coating should afford sufficient protection unless the contents hazard is liable to be especially severe.

Beams and Girders

The New York Code calls for the entire casing of iron and steel beams and girders in fireproofing materials not less than two inches thick at any point when supporting a wall or part thereof, or a sidewalk, and not less than one and one-half inches in any case.

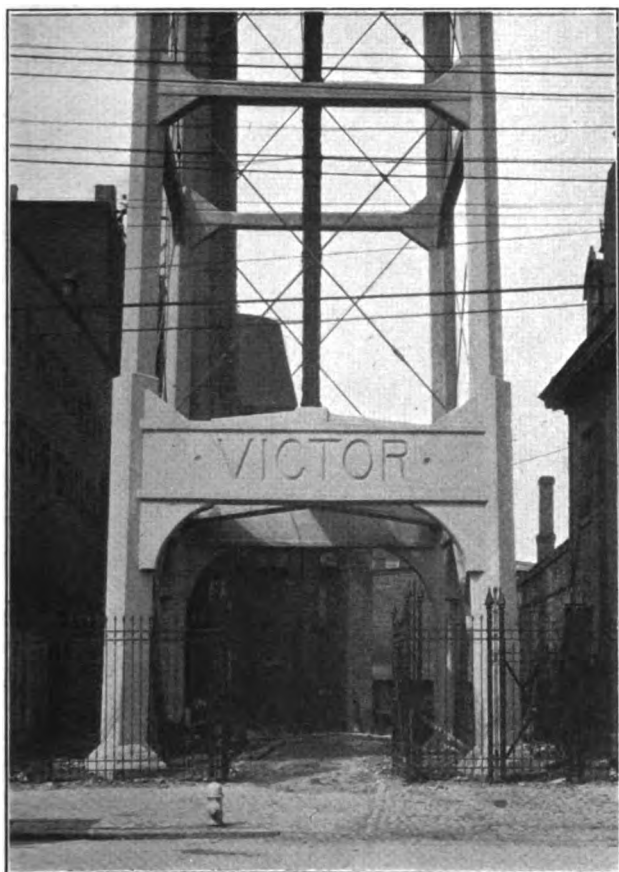
The Fire Underwriters' Code suggests that the protection of the webs and bottom flanges of girders and

all members of trusses shall have a thickness of not less than two inches at all points. The protection of webs and bottom flanges of beams, lintels and all other structural members shall be not less than one and one-half inches.

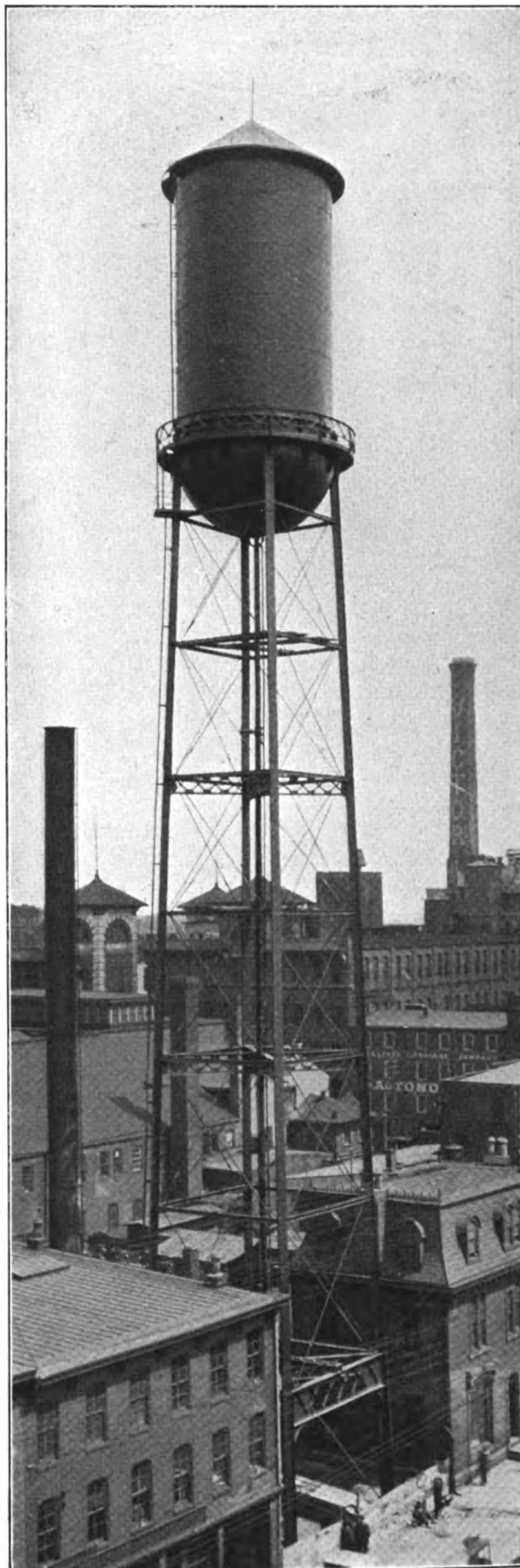
It is proposed, when hollow tile is used for the protection of the lower flanges of beams and similar members, these members shall be encased either by lugs which form part of the skewbacks and extend under the flanges meeting at the middle; or by tile slabs engaged into dovetailed lugs which form part of the skewbacks. In all cases the joints to be solidly filled with mortar.

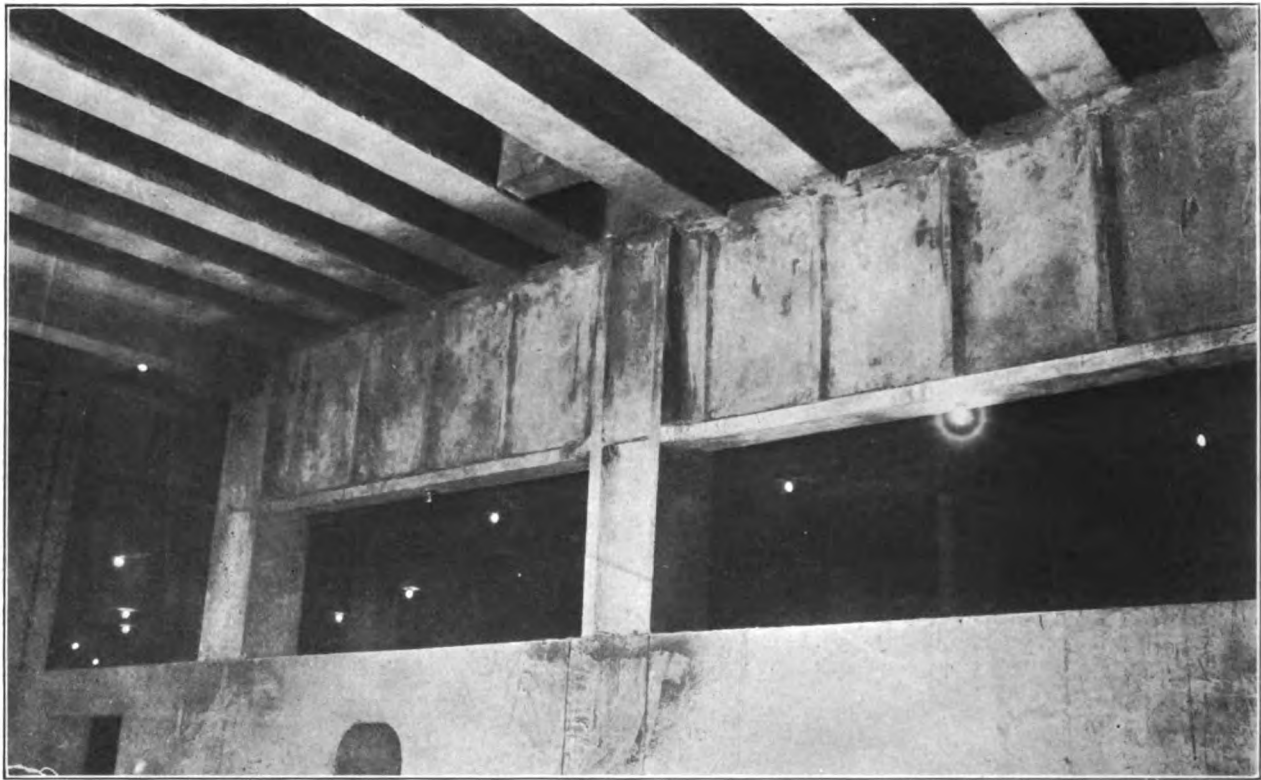
Under concrete protection for all structural members, suitably designed interior steel anchors securely attached to the members at intervals not exceeding eight inches shall be provided for the purpose of securely holding the protection of the lower flanges. Provision shall be made to prevent the displacement of these anchors while the concrete is being deposited.

Both Codes agree on a thickness of two inches at



The photograph to the right shows the dangerous condition of unprotected steel tank supports. What would happen if there was an adjoining fire? Above is same structure protected with concrete





Heavy steel members, Grand Central Terminal, fireproofed with Gunitite

all points when protecting vital members of the metal structure and all members shall have at least one and one-half inches at any point.

Lintels

Both Codes agree on one and one-half inch protection for lintels, except that the New York Code requires more protection where the opening spanned is over four feet in width, or where such opening is spanned by an adequate masonry arch over the lintel, in which case the fireproofing may be omitted.

Trusses

Both Codes require two-inch protection for trusses.

Concrete Protection

In the construction of the Vancouver Terminal Station for the C. P. R., where some 3,200 tons of structural steel was used, the columns, girders and beams were protected with 1-2-4 gravel concrete, which was effectively reinforced with steel rods held in place with special novel hoop-rods securely attached to the structural members. Extreme care was exercised in the selection and use of the aggregates to insure the complete protection of the soffits of the girders and beams. Inspection of this work after the forms were removed showed an absence of voids and all surfaces completely protected.

It is most necessary that great care be exercised in

the selection of the aggregates and the placing of concrete when used in fireproofing structural members. In a recent piece of work in one of the large cities it was found after removing the forms that the soffit fireproofing of the girders and beams would not stand a test, breaking under light blows of a hammer. Here the coarse aggregate was too large and the flow of the concrete was checked between the edges of the lower flanges of the beams and girders and the form. In this way large areas of protection which appeared to be perfect, in reality contained many hollow spaces which required expensive patching. The aggregate in fireproofing should never exceed three-quarters of an inch in size.

Concrete, the Codes agree, should be one part of cement, two parts of fine aggregate, and either four or five parts of coarse aggregate, which shall not be coarser than will pass through a three-quarter-inch ring, all suitably reinforced with wire or metal fabric. When cinder concrete is used the material must be clean and well burned.

When stone concrete is used for fireproofing, wherever possible, igneous rock should be chosen for the coarse aggregate. When testing stone concrete where limestone has been used for the coarse aggregate, it has been found that the stone expanded and caused disintegration and spalling the mass. In some of these

tests, before the end of the testing period, the supporting steel members were so affected by the heat that they sagged sufficiently to have caused collapse under conditions of actual usage.

An interesting method of fireproofing steel is the Cement Gun process. Here cement, sand and water are forced through a hose by compressed air and sprayed on the metal member to the required thickness of fireproofing. The aggregate formed, called Gunitite, is dense, homogeneous, strong and waterproof. Photographs below show the use of Gunitite, and a later article will thoroughly describe its use for fireproofing.

In the matter of proper materials to be used in the protection of structural metal both Codes agree on terra cotta, brick and concrete.

Terra cotta blocks as required by both Codes shall be porous or semi-porous; the New York Code calling for a shell or web thickness of at least one inch, but the Underwriters' Code allows a thickness of five-eighths of an inch. The Underwriters' Code also mentions the allowable use of solid terra cotta blocks.

In the matter of the thickness of shells and webs it would seem that three-quarters of an inch would be sufficient thickness if proper air spaces are provided. This question of air spaces is important and is becoming recognized by manufacturers. In materials where it is possible, air space should be provided in that part of the protection which covers the lower flanges, in order that heat applied at a certain point

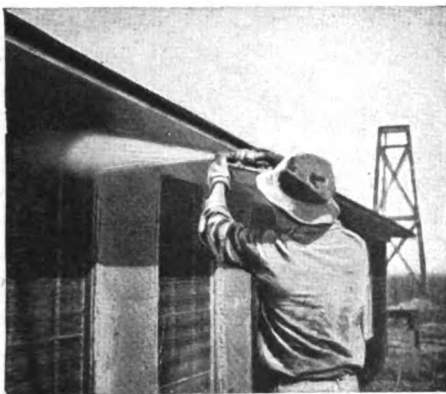
may be distributed by circulation along the members, thus lessening its effect.

Terra cotta, or, as it is commonly called in the form used for the fireproofing of structural metal, hollow tile, is a most excellent and widely used material, forming a perfect fireproofing medium if properly specified and applied.

At the present, terra cotta is discriminated against in many building codes throughout the country, due to the fact that it has often been wrongly specified and used in forms which have failed in many fires. What the terra cotta industry lacks to-day is a standard specification for the use of hollow tile, and only when such specification is prepared and proven will hollow tile take the place in the building field which it so well deserves.

A new committee of the American Society for Testing Materials has been formed for the purpose of detailing proper tests for terra cotta fireproofing, and its findings will pave the way to tests from which such specifications may be drawn up and nationally adopted.

The proper fireproofing of structural metal is a subject to which the closest attention should be given by architect and owner alike, particularly in those sections of the country where building regulations are not as yet sufficiently comprehensive to point out in a specific manner the necessary materials and method of application. In many fires the principal damage has been from collapses which resulted directly from improperly fireproofed metal members.



USING THE CEMENT GUN

Reinforcing for Gunitite protection of metal members in Grand Central Terminal





The Editor's Page

*IN the busy hours of every day
We pause—
To analyze and weigh
A striking word, or deed, or
thought.*

The Need for State Fire Prevention Commissions

ONLY the other day a senator of one of the greatest of the United States of America was a welcome guest in our office. The natural trend of the discussion was along the lines of the reduction of the great national fire waste by encouraging and enforcing proper firesafe building construction. "I have been thinking seriously of the matter of loss of life in recent fires. Why should our school children be forced to spend their time in buildings where the fire hazard is severe? Why should young girls and men lose their lives in buildings which are criminally hazardous?" What can be done to improve these conditions? he questioned.

This is the nation of the Great Unthinking People. Great public disasters arouse the press and the people. For a few days the leading question is, "Who is to blame?" We start an "investigation"—who ever heard of the result of such an investigation? The excitement and interest dies away; the intelligent citizen watches the papers for a short time and wonders what has been done; the incident, carefully wrapped in legal papers and tied up with red tape, is laid away on the national shelf.

In the investigation of fires which have entailed large property losses and the loss of lives, the question at issue should not be "*Who* is to blame?" but "*What conditions* are to blame?" More and more is the current of public opinion turning toward the sensible solution of the problem.

There can be no doubt that the efforts which are being made for the purpose of preventing fire losses lack co-ordination. The old saw, "Too many cooks spoil the broth," is again justifying its conception. State legislation has entered the field of fire prevention, factory commissions, boards of health and sanitary control, building departments, tenement house departments, insurance commissions and fire-prevention bureaus are all doing excellent work, but, unfortunately, many times they work at cross-purposes. In many cases the burden on the property owner is severe, he is bewildered by the many requirements and suggestions.

These conditions point clearly to the crying neces-

sity for one central body in each state *which would have proper means at its disposal for purposes of investigation and the power to act according to the facts brought out by that investigation!*

The lessons taught by the burning of schools, theatres and industrial buildings, with the accompanying loss of life under horrible conditions, are these: Let us appoint State Fire Prevention Commissions, composed of delegates from the various interested bodies, such as building departments and manufacturers and insurance associations. Let them first of all turn their attention to the matter of safeguarding our people in places of public assembly. Enforce the consistent firesafe construction of schools, theatres, factories, department stores and other buildings wherein fires particularly threaten life.

Establish building codes which will standardize the construction of these buildings along proper lines and then enforce those codes with a strong hand. With such a body as this all friction in the matter of fire prevention would be cleared up as it has been in Europe. There would be no doubt in the mind of the property owner as to just what he has to do in the matter of safeguarding himself and his neighbors from fire loss. There would be no more friction between the building departments and various inspection and investigating bodies. Then, too, the public would "get the habit." To build for safety would become a natural part of the national existence, taking the place of our deplorable capacity for forgetting unpleasant things.

Let us no longer be the Great Unthinking People, and to those who may object to this term we can only say: "Go, for instance, to Chelsea, Mass., where the great conflagration swept the town clean a few years ago. There still exists the wood shingle and frame house hazard! Go into some of the great department stores of America—what would be the result of sudden fire and panic there? Go almost anywhere and find if you can a city, or town, or a group of buildings immune from the fire danger!" But rather centralize the efforts which are now being made and apply pressure which will enforce safety in building construction.



William Law Bowman
Attorney and Engineer

Leaders in Their Respective Fields

Valuable Additions to the Editorial Staff of CONSTRUCTION



Bruce E. Loomis
Insurance Engineer

LEGAL EDITOR

A graduate civil engineer of Cornell, a practicing attorney with a Harvard degree of Bachelor of Laws, and a Director of the American Society of Civil Engineers and Contractors, Mr. Bowman is particularly well versed in the law as it relates to the architect, builder and property owner.

As a writer and lecturer on this general subject he is well known, and his articles, reviews of new ordinances and court decisions, and answers to questions which will appear every month in CONSTRUCTION will prove of direct interest to the fraternity.

He is the author of:

Legal Hints for Architects:

- Part I—Before employment—Statutes—Employment by individual.
- Part II—Employment by business corporation—Employment by municipal corporation.
- Part III—Employment by municipal corporation, counties, towns—by United States.
- Part IV—Duty to employer during employment.
- Part V—Duty to contractor.
- Part VI—Architect's authority—Substantial performance—Satisfaction of Architect—Uniform contract, Art. I and II.
- VII—Uniform contract, Art. II—Ownership of plans and specifications.
- VIII—Extra work—differentiation, alteration and additional work.

Architectural Jurisprudence:

- Part I—An architect's compensation.
- Part II—An architect's liabilities to State, employer, contractor and other persons.
- Part III—An architect's extra work.
- Part IV—An architect as an arbitrator.
- Part V—An architect in municipal work.
- Part VI—The architect in court, proving his contract, as a witness and expert.

Partnership Agreements for Engineers:

Awarded Fuertes Medal for Original Research, Cornell University, 1911.

Legal Questions Respecting New York Municipal Law:

Lecture before Am. Soc. C. E. and Contractors, and published in their journal.

Legal Suggestions Respecting Road Contracts:

Lecture before Third American Road Congress, Detroit, Mich., 1913.

The Engineer and the Law:

Lecture before Harvard Engineering Society, 1914.

INSURANCE ENGINEERING EDITOR

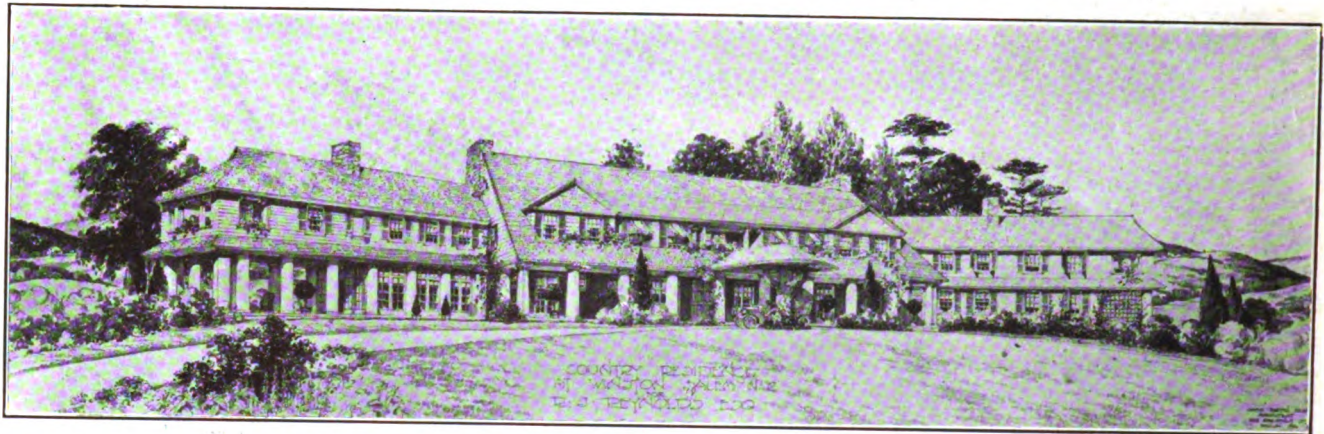
During the past ten years the profession of insurance engineering has attained a high degree of prominence, and as the demand for firesafe building construction grows, it is destined to occupy a still more important place. The attitude of the great underwriting bodies of the country toward large building projects is a matter of serious concern to property owners, and knowledge of the requirements of such interests and how properly to meet them call for peculiar ability.

Bruce E. Loomis, of New York City, stands in the forefront of our national insurance engineers, and CONSTRUCTION has indeed been fortunate in attaching him to its editorial staff. A graduate engineer, Mr. Loomis has been identified with some of the country's greatest building projects, and his services as consultant upon fireproofing questions are in constant demand. Notable among his recent engineering activities are the firesafing of the Walker-Lispensard Telephone Exchange and of the Equitable Building of this city, the safeguarding against fire of the Canadian Pacific's extensive hotel system, and the virtual rebuilding of many of the street railway properties of the East and the Central West.

Under his direction millions of dollars have been expended in the erection and equipment of structures with a view of eliminating the fire hazard therefrom, with the result that most of our important cities now have, or shortly will contain, one or more structures that will serve as admirable models in this important respect, and will likewise serve as strong fire retardants should sweeping conflagrations occur.

No one in the United States is more familiar with the value of proper building materials and fire protection devices than Mr. Loomis, or more competent to advise readers of this magazine regarding their preparation and employment.

Safety and Beauty in Construction



That our wealthy citizens are now alert to the fire hazard of improper building methods is attested by the study they are giving to the subject and the insistence that proper safeguards be employed in the construction of their homes.

One of the most conspicuous examples in this respect is the commodious and attractive residence in course of erection near Winston-Salem, N. C., for R. J. Reynolds. The structure, a view of which appears above, was designed by Charles Barton Keen, of Philadelphia, and is being built under his close supervision.

The method of construction employed is steel frame, with long span reinforced concrete beams. The partitions and floors are of hollow tile. The main hall

is two stories in height, the third floor span being 35 feet, 3—Bethlehem 140 No. 1 beams being used. Throughout, the structure is wholly fireproof except the roof structures, which are of wood, though covered with tile for exterior protection.

Close attention has been paid to the comfort as well as the safety of the occupants in designing the house; electric dumb waiter, a refrigerating and ice making plant being among the special features arranged for.

When completed Mr. Reynolds will have in his new residence, one that is not only highly artistic and commodious, but from which the fire hazard has been practically eliminated.

The "Build Now" Movement a Success

Of interest to manufacturers, builders and building material dealers is the result of a local campaign to encourage building at the present time.

Edward A. Roberts, secretary of the Builders' Exchange of Cleveland, reports as follows:

"The Ohio State Association of Builders' Exchanges, at their convention in Columbus in January, started a "Build Now" movement which has had good results in Ohio. The convention adopted the following resolution by unanimous vote:

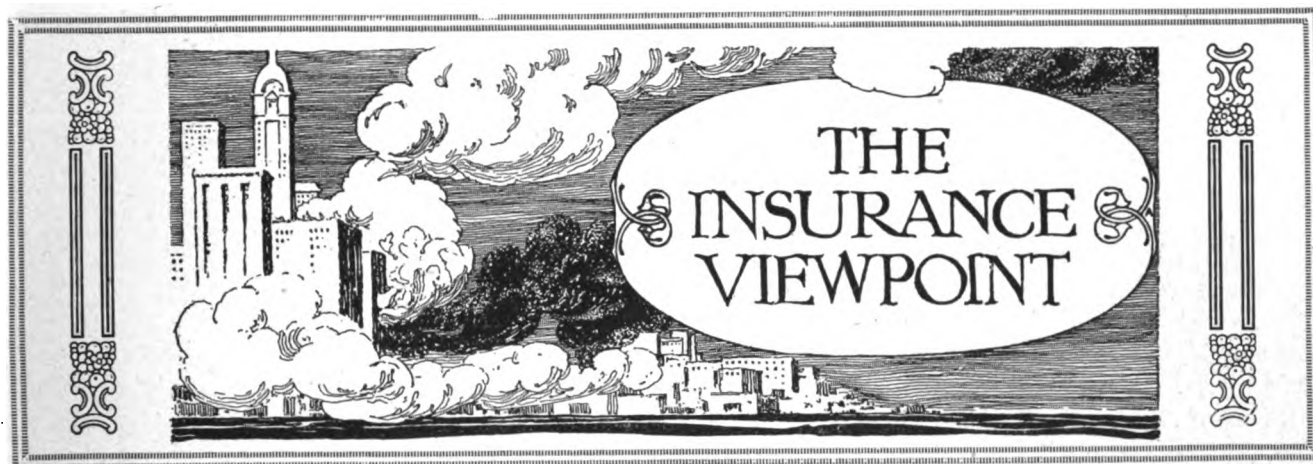
"Resolved, By the Ohio State Association of Builders' Exchanges that this association emphasizes the fact that the present is an opportune time to start building operations. Many skilled workmen are out of employment, especially in the large cities. Architects and contractors are not rushed with business, and better attention can be had from material firms than during the active building season. In some lines concessions are being made in prices to stimulate orders and more accumulating stocks in yards and warehouses. We, therefore, believe that the States, cities, counties and private owners having any building work to do will profit by having the same done now rather

than delaying until the spring rush is under way.

"Governor Willis, in harmony with the foregoing resolution, issued an address in which he recommended that the spirit of the same should be observed as far as possible, and gave to the movement his enthusiastic support. The co-operation of the Builders' Exchanges in eleven of the leading cities of the State was enlisted and publicity was obtained in nearly all the newspapers.

"In Cleveland certain reductions were made in prices to stimulate the activity, and interviews were had with owners in an effort to persuade them to start operations without delay, as a means both of economy in the operations and the general benefit to business and those engaged in the same. The results of the campaign have been apparent in the building records, as an observation of the figures for this city will readily show, the totals for the first five months of the year, as compared with the same period last year, being upwards of two million dollars of an increase."

Careful consideration of this idea may show it to be worth trying in your neighborhood. The resolution quoted above clearly outlines the general building situation to-day.



Measuring the Fire Hazard of Dwellings

Those who loudly clamor for a more rigid supervision of fire insurance rates by State authorities, declaring that such procedure would result in a material reduction in premium charges, have given but superficial study to the question, and their contention is easily refuted by a proper marshalling of established facts. It is an inexorable economic law that all loss must be met, either wholly by the individual primarily affected or by the community at large. Broad distribution of fire loss is effected through the present practice of fire insurance. Companies, whether stock or mutual, simply act as clearing houses for the distribution of losses, assessing upon for the many the misfortunes of the relatively few. While a more scientific method for ascertaining fire hazards than has yet been applied would result in a better adjustment of penalties, it would not decrease the aggregate amount collected; for it remains indubitably true that for every dollar of loss a refund tax of one hundred cents must be assessed.

Plainly, then, the only rational way to reduce the total insurance cost is to curtail the annual fire waste, and this, of course, can be done most effectively by improving our buildings along fire-resistive lines.

Progressive underwriters long ago recognized the crudity of the rating methods then employed, and have been steadily seeking their improvement. Schedules were devised for measuring hazards in different classes of risks, and every effort has been put forth to make these as nearly equitable as possible. Absolute accuracy, of course, can never be attained, the moral and physical factors in no two risks being exactly alike.

Speaking of dwelling ratings in New York a short

time ago, State Superintendent of Insurance Jesse S. Phillips said in part:

"Dwellings, which constitute the largest class of risks, have been rated in accordance with a uniformly applied schedule and table of minimum rates, based upon considerations of relative fire protection. The general result of this change is thought to be a revision downward, although it was found that a number of cities and villages were rated lower than was warranted by the fire protection enjoyed by them. A schedule and table of minimum rates for farm property has also been adopted, insuring uniformity at least as far as county lines are concerned. In this connection attention may be called to an interesting experiment made in dividing the counties of the State into three groups and applying different rates to each of the groups. This division is based upon the unaccountable but consistent differences in the burning ratios which were found to exist in the different sections of the State among risks of apparently identical physical hazards. Another important reform, which undoubtedly has been brought about by the passage of the statute referred to, has been the adoption of the schedule for measuring the degree of fire protection in cities and villages throughout the United States. Thus far some 300 cities and villages in New York State have been inspected and graded, and the work is still in progress. Further, a schedule for rating mercantile risks has also been adopted and is being extended systematically to entire localities. Although the work of rerating is still a long way from completion, it appears to be making as rapid progress as circumstances permit, and thus far has not caused the widespread upheaval usually attendant upon rapid and revolutionary changes throughout an entire field."

Upon complaint of the School Board of Duluth that the local Rating Bureau was not allowing credits for co-insurance as its regulations called for, the Minne-

sota Insurance Department directed the Bureau to reduce its five-year term rate from \$1.64 to \$1.45 per \$100 of insurance. The order was complied with.

How Property Burns in Oregon

Hon. Harvey Wells, Insurance Commissioner of Oregon, secured from all fire insurance companies operating in the State a memorandum of their losses suffered during the first seven months of the present year—January to July, inclusive. The returns, supplied by 87 out of the 144 companies addressed, show the following aggregates: Losses upon buildings, \$198,110.79; their contents, \$403,584.76. Dwellings, schools and churches, in communities having fire protection, \$156,409.79; in centers without protection, \$163,290.51. Upon manufactures designated as "special hazards," \$192,414.48. The total loss reported was \$1,113,441.33. Assuming that the companies not reporting their experience suffered in the same ratio as those filing returns—and the assumption is a fair one—the aggregate insurance loss for the period above noted would exceed \$1,500,000. The drain is a severe one, and should emphasize to the citizens of Oregon the imperative need for taking concerted action toward improved building practices.

The lowest bid—\$149,715—received for erecting the proposed new high school at North Adams, Mass., exceeding by \$25,000 the allotment for the work, modified plans will be prepared and new bids sought.

To cost in the neighborhood of \$300,000, the contract for the erection of the new hospital on Cedar avenue and Fifty-third street, Philadelphia, by the Sisters of Mercy was given to John McShain, of the Quaker City, some days ago. The structure will be of the Italian Renaissance style of architecture. Brick, stone and terra-cotta will be used in its composition.

Toy Balloons Start Fires

During the past summer lighted toy balloons have caused a number of fires in Terre Haute, Ind., giving the authorities to seriously consider the future prohibition of this form of amusement. While the majority of the fires were of a minor nature and easily extinguished, two at least were serious, that experienced by the Terre Haute Paper Company resulting in a loss of about \$10,000. This aerial hazard supplies an added argument against wooden roofs.

Effective Fire Barriers

While asserting that severe group fires are possible in the mercantile district of Cedar Rapids, Iowa, because of the "general weak construction" of the buildings there located, the engineers of the National Board of Fire Underwriters concede that several of the fireproof structures form effective or partial barriers to sweeping conflagrations.

Henon & Boyle, Philadelphia architects, are preparing plans for a hotel to be erected for the Remington Hotel Company at Eddystone, Pa. The proposed structure, to cost \$150,000, will be of brick, stone and concrete, and will accommodate 600 people.

Concrete, brick and steel will be used in the erection of the fireproof foundry planned for the J. A. Oberhelman Foundry Company of Cincinnati. The proposed structure is to be one story in height, and will occupy 130 by 240 feet of ground space.

Fire Losses and Rebuilding Plans

BRIDGETON, N. J.—Sparks falling upon the shingle roof of the Wesley Memorial M. E. Church are held responsible for the recent complete destruction of the property, with a loss of \$15,000. The structure will be rebuilt of stone, with slate roofing.

MUNCIE, IND.—Scarcely had the embers from the fire in the plant of the Gill Clay Pot Company cooled before rebuilding was underway, the work being rushed toward completion as rapidly as possible.

BOWLING GREEN, MO.—Fire in the cupola, supposed due to electric wiring, caused the destruction of the County Court House a short time ago. Up to a late date rebuilding plans, while discussed, had not been decided upon.

ATLANTIC, PA.—Profiting by the lesson taught in the recent burning of his property, B. G. Palmer is rebuilding the destroyed structure of cement blocks. Cement, too, will be the material used both for floors and roof, thereby reducing the possibility of future fire to a minimum.

SNYDERVILLE, OHIO.—A loss of close to \$10,000 resulted from the burning of the cribs of the Harshman Grain Company. The buildings are being reconstructed along improved lines.

CONCORD, CAL.—While the cause of the burning of the Concord Presbyterian Church is unknown, the theory favored is that of improper electric wiring. Certain of the trustees

favor rebuilding the destroyed edifice along firesafe rather than upon conventional lines.

POLK, PA.—In rebuilding the power house of the State Institution, destroyed by fire a short time ago, the management, Superintendent J. M. Murdoch advises, contemplates the erection of a fireproof structure. He adds that if practical a new laundry will be built of the same general type. The fire resulted from the breaking of a 4-inch gas line in the boiler house.

CLAREMONT, MASS.—While the management of the Frary Manufacturing Company, whose plant burned on November 22, is uncertain as to future plans, it is considered probable that a new property will be erected.

CHARLESTOWN, IND.—From some unknown cause the mill of Eberts & Brother was wholly destroyed by fire, the aggregate loss being over \$30,000. Rebuilding, General Manager E. C. Eberts says, will begin once a desirable site has been secured. Just what form of construction will be used has not yet been determined.

IRWIN, PA.—Damage approximating \$20,000 resulted from the burning of the McClelland Block, one of the prominent business buildings of the city. In the reconstruction, steel and concrete only will be used in the boiler house, Mr. McClelland being determined that firesafe material shall house this important feature.



How Automatic Sprinklers Reduce Insurance Rates

High appreciation of the protective value and saving in fire insurance rates effected in their respective properties through the installation of automatic sprinkler equipment, is supplied by over a hundred prominent manufacturers of Wisconsin, the information being addressed to the Insurance Commissioner of the State in response to a specific inquiry upon the subject by that official.

From the statements in hand we make the following excerpts:

Appleton Wire Works, Appleton: "Our experience with the sprinkler equipment has been exceedingly satisfactory. The former insurance rate upon the plant was \$13.00 per thousand; following the installation of sprinklers the charge was \$1.30 per thousand."

Interlake Pulp and Paper Co., Appleton: "The rate formerly charged us for insurance was \$1.30 per hundred dollars; it is now less than 25 cents, so that we paid for the sprinkler equipments in less than three years' savings upon our insurance premiums."

Malleable Iron Range Co., Beaver Dam: "Use of sprinkler equipment reduced our insurance rate from \$15.00 per thousand to \$2.80 per thousand. We recommend sprinkler equipment under all conditions where the buildings are of any permanency or value."

Beloit Iron Works, Beloit: "We are strongly in favor of sprinklered properties. Before their installation the lowest insurance rate we could get was \$1; the charge now ranges from 6 to 8 cents."

Island Woolen Co., Baraboo: "In the absence of exposure to outside hazards, if we could not have both insurance and sprinkler equipment, think we would have chosen the latter. Insurance cannot compensate for irreparable losses. Sprinklers can to a very large degree prevent them."

Excelsior Shoe and Slipper Co., Cedarburg: "Our insurance premiums have been reduced from \$1,100

annually to \$120. We heartily favor sprinkler systems."

Hand Made Shoe Co., Chippewa Falls: "We were influenced to put in sprinkler equipment by the fact that the insurance rates on our building and contents were reduced from \$1.25 and \$1.35 to a flat rate of 12½ cents."

Northwestern Lumber Co., Eau Claire: "Our experience has been that in no case have we failed to save in the insurance paid the cost of the sprinkler equipment in five years."

Northwestern Manufacturing Co., Fort Atkinson: "We equipped our plant a few years ago at a cost of from \$12,000 to \$15,000, and we feel that we have been repaid for the expenditure long ago. We certainly would not be without this protection at almost any cost."

Brenner Candy Co., Green Bay: "We were paying \$1.69 for insurance and got the rate reduced to 29 cents."

Von Brunt Manufacturing Co., Horicon: "Having equipped our factory here with automatic sprinklers, we have some appreciation of their advantages. We saw our insurance rates decrease from \$3.25 to \$1.50 for partial installation, and below 30 cents for complete installation. As a business proposition it certainly does pay."

Simmons Manufacturing Co., Kenosha: "We are firm believers in the protection afforded by automatic sprinkler systems, and our entire plant, incorporating practically three million square feet of floor space, is sprinklered."

N. R. Aller's Sons Co., Kenosha: "We would have had several disastrous fires if it had not been for the automatic sprinkler protection."

John A. Salzer Seed Co., La Crosse: "We installed a system in our plant some three years ago and would

not return to the old system under any consideration. It has practically paid for itself in the saving of insurance already."

Menasha Paper Co., Ladysmith: "We have never known them to fail when called upon, and they no doubt have saved us from considerable fire damage."

William Doerflinger Co., La Crosse: "A sprinkler system can best be described as the equivalent of having a man with a hose on the job during the entire twenty-four hours for every hundred square feet of floor area. We feel that way. Our insurance rate has been reduced from \$1.20 to 19 cents."

Pfister & Vogel Leather Co., Milwaukee: "While we have had several small fires in our plant, in every instance these were checked by the sprinkler system, and we have never made claim upon the insurance companies for losses due to fires when we have had the sprinkler equipment."

Gimbel Brothers, Milwaukee: "We have every confidence in sprinkler equipments and highly recommend their use. We deem it good business judgment to install sprinklers throughout our various properties."

Cream City Bedding Company, Milwaukee: "Upon more than one occasion the automatic sprinkler system, with which our factory is equipped, has saved our plant from destruction. We cannot say enough for the installation or recommend a sprinkler system too highly."

Goodyear Rubber Co., Milwaukee: "Our old store had no sprinkler system and so burned down in a night. Our new store has a complete sprinkler system. Insurance rates on old store was 95 cents and on the new store is 18 cents."

Interior Woodwork Co., Milwaukee: "A complete sprinkler equipment was installed in our plant a year ago. We consider this the only safe method for prevention of fire, especially in manufacturing plants."

Boston Store, Milwaukee: "We are devout believers in sprinklers. Previous to the installation of same in our house we paid \$1.75 for insurance, while to-day we enjoy a 35-cent rate."

Western Leather Co., Milwaukee: "A sprinkler system in a plant such as ours effects sufficient saving in premiums to pay for itself in about six years."

Wallace & Smith Co., Milwaukee: "In our Milwaukee business we have confidence enough in the sprinkler system to invest something over \$10,000 in putting it into leased buildings, where the entire thing will finally revert to the landlord without any return to us whatever."

George Martin Leather Co., Milwaukee: "Our insurance rates to-day less than one-half what they were before we had the sprinkler equipment."

Wisconsin Knitting Mills, Manitowoc: "The saving in fire insurance premiums paid for our sprinkler equipment in less than four years, the rate having been reduced from 97 cents to 19 cents."

Menasha Wooden Ware Co., Menasha: "Before we equipped our plant here with a sprinkler system we were paying a rate of $4\frac{1}{2}$ per cent on approximately a half million of insurance. We are now paying 60 cents on about \$600,000 of insurance. This reduction in rate is a direct result of the installation of a sprinkler system."

Lauerman Brothers Co., Marinette: "At the time we installed this system we were paying on our retail stock \$1.62 per \$100 of insurance, which rate has since been reduced to 40 cents per \$100."

Buckstaff Company, Oshkosh: "Our present insurance rate is 50 cents per \$100 of insurance. On the amount of insurance we carry this is a saving of \$6,000 per year over what we would have to pay if we did not have sprinklers."

R. McMillen Co., Oshkosh: "Our complete system cost us about \$12,000, and the saving on the item of insurance, as compared with what we were paying, will pay for the equipment in four or five years."

Morgan Company, Oshkosh: "Our company is strongly committed to protection against fire, which is provided by automatic sprinklers. Our manufacturing plant here, together with our large distributing warehouses at Chicago and Baltimore, are fully equipped with this form of safeguard."

J. I. Case Plow Works, Racine: "It would be a very unusual fire that would not be checked with little damage if the sprinkler system were kept in order. We have not found the upkeep at all excessive, and certainly have found a great benefit in the way of reduction in insurance rates."

Arnold Electric Co., Racine: "We installed a sprinkler system in our factory a few years ago. Our old insurance rate was \$1.65, our new rate is 10 cents. This is a big saving, and it has been a very good paying proposition for us, besides giving us much better fire protection."

S. Freeman & Sons Mfg. Co., Racine: "We installed a sprinkler system in our plant two years ago. Prior to that time we were carrying fire insurance to the value of \$160,000 and paying about \$2,500 a year for it. After putting in this sprinkler system, which had 2,700 sprinkler heads and cost us about \$20,000, we had our whole plant insured for \$250,000 at a cost of \$625 for three years."

Racine Wagon and Carriage Co., Racine: "Our company was the first in Wisconsin to install automatic sprinklers. The first installation was only partial and in the more hazardous places. It cost \$6,000, which was all returned in 25 months with interest. We then completely installed and the rate became about one-tenth of the old rate."

H. C. Prange Co., Sheboygan: "We cannot recommend sprinkler systems too highly. The cost of installing the same is paid in the course of four or five

years through the reduction of the annual premiums, and in addition one has the protection against fire."

Coyne Furniture Co., Stevens Point: "We found that after installing the sprinkler equipment we reduced our insurance rate to one-tenth of what we were paying formerly."

Winter Company, Sheboygan: "Our insurance rate was \$3.80, but since the installation of the sprinkler equipment the rate was reduced to 42.1 cents."

Jung Shoe Co., Sheboygan: "Our average cost of insurance has been just about 10 cents per \$100, or \$100 per \$100,000 of insurance. We consider our sprinkler system a splendid investment, and where other firms in this city installed them they have effected a saving of from 50 cents to 85 per cent. So far in this city we have had no disastrous fire in any factory equipped with automatic sprinklers."

Sheboygan Coaster & Wagon Co., Sheboygan: "Our building is a five-story and basement brick structure 50 x 120 feet, and the whole system complete, with tank, cost in the neighborhood of \$6,000."

Sell Bros. Co., Sheboygan: "Our system covers a space of 40,000 square feet, and we use about 600 sprinkler outlets. The system cost us somewhere between \$1,500 and \$1,800. Rate 35 cents per hundred."

Hamilton Manufacturing Co., Two Rivers: "Sprinklers have been added from time to time as our plant was enlarged until we now have a sprinkler equipment which has cost us about \$40,000, and our insurance rate is 30 cents. We have never had a fire loss in the history of our business."

Cincinnati Architects Meet

At the annual gathering of the Cincinnati Chapter of the American Institute of Architects, held on the 9th ultimo, George M. Anderson, of the architectural firm of Elzner & Anderson, was unanimously re-elected president of the organization for the new year. It is probable that the Chapter will secure permanent headquarters in the near future, the conviction being that such action would stimulate interest in the organization on the part of present members and prove a magnet for attracting others.

Movie Theatre in Residence

A departure in residence construction will be the inclusion of a completely equipped motion picture theatre in the Chicago home now being erected for S. S. Hutchinson. Designed by the Chicago architectural firm of Tallmadge & Watson, the building will be of the Italian Renaissance style. It will be semi-fireproof, the first story being of reinforced concrete, the remainder being supported on a steel frame.

Recent Building Projects

The special committee charged with considering the erection of an isolation hospital at Fitchburg, Mass., favors the building of a structure to cost about \$25,000.

Marlboro, Mass., is to erect a \$40,000 schoolhouse, and has selected the Boston architectural firm of Berry & Davidson to prepare plans and supervise the construction. The same firm designed Marlboro's new municipal building.

Framingham, Mass., is facing the proposition of erecting a new grade school to relieve the severe congestion existing in Precinct 5.

Of the \$70,000 assigned for building a new grade school at Westfield, Mass., it is figured \$10,000 will be required for the purchase of a site, leaving \$60,000 to be expended upon the structure.

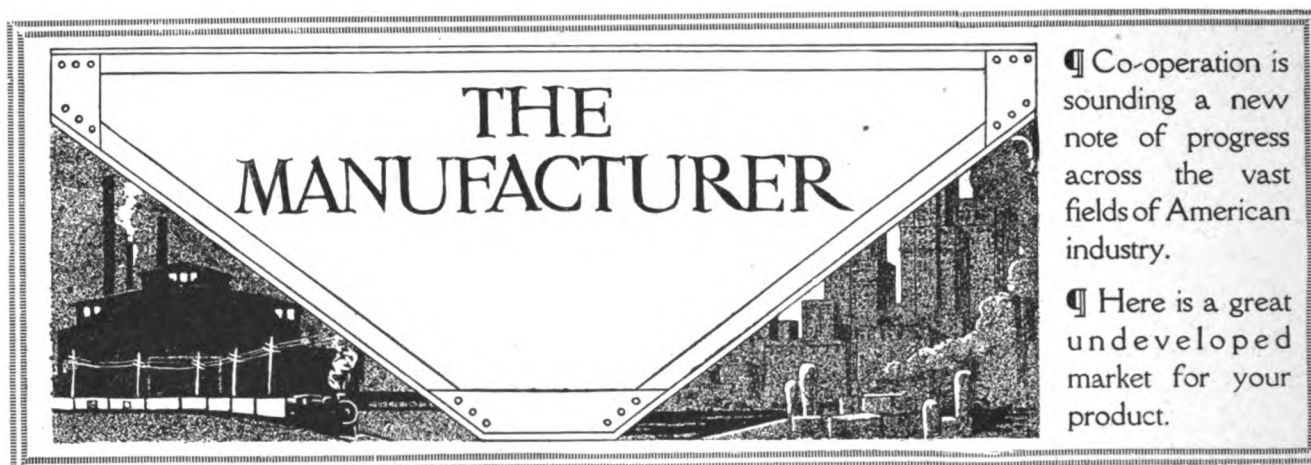
A concrete hotel to cost \$2,000,000 will replace the famous Oriental Hotel at Manhattan Beach, N. Y. The present hostelry, built about 30 years ago at a cost of \$500,000, is wholly of frame. It will be razed, immediately following which work upon the new structure will commence.

Within a short time the two new fireproof buildings of the Washington University School at St. Louis, Mo., will be ready for occupancy. Both are of concrete construction.

Contractor P. O. Nasirk plans to complete the new St. Paul (Minn.) German Evangelical church early in the present month. Of brick construction, and with a seating capacity of 900 persons, the church will cost about \$42,000.

M. L. Finkelstein and I. H. Rubin plan to spend \$350,000 in the erection of a new theatre and hotel at St. Peter and Wabasha streets, St. Paul, Minn. Excavation work upon the site is now in progress.

Two fine new apartment hotels shortly to be open for rental at St. Paul, Minn., are the St. Michael and St. Agatha. Their features are described in part by their owner as follows: "Exterior of terra cotta and impervious brick. Ten stories and basements, containing six stores on street floors and 108 one- and two-room apartments, with kitchenette and bath. They are of reinforced concrete construction, with tile floors and partitions, and are absolutely fireproof from within; nothing short of a general conflagration could seriously damage the buildings or their contents. Floors of Winslow's catestholic composition." Mark Fitzpatrick is the architect, and the Wells Brothers Company contractors.



THE OPPORTUNITY FOR CO-OPERATIVE SELLING

From every hand comes endorsement of the community plan of promoting fire-safe building materials. The effort being advanced by the Society Advocating Fire Elimination is in harmony with the spirit of the times.

The idea that burned clay products, cement, stone, gypsum, metal lath and metal lumber are not competitors, quite unique at the time the S-A-F-E launched its movement, is now generally accepted by the men at the head of the promotion work in these several industries.

These men are embracing every opportunity to get together and to know each other better. There is much less fighting among the group than there was a year and a half ago, and the S-A-F-E, as the father of the thought, is being credited with stimulating the peace movement.

It is estimated that less than one per cent of the buildings erected in the United States each year are consistently fireproof. That leaves the immense field of ninety-nine per cent of all building open for development by the fireproofing interests. The absurdity of conducting a ruinous fight for the one per cent while there is so much more fertile ground unworked will appear to all who give the question a moment's thought.

It is the S-A-F-E plan to go after the ninety-nine per cent of building because there is where the fire hazard exists, and therein is the only opportunity to cut down the losses. The hazard is practically eliminated from the one per cent already.

Some recent examples of community advertising and promotion work have appeared in well-known journals. The asphalt shingle manufacturers are conducting a campaign in the interest of their product. The name of no manufacturer appears in connection with the advertising. It is an effort to tell the prospective builders of the country that asphalt shingles are as durable and as economical to use as wooden shingles, and that they are fire-resisting to an extent that makes

them much safer as a house covering. No doubt there are many asphalt shingle manufacturers profiting from this campaign who do not contribute to its maintenance. That does not matter. The important thing is that it is helping those who do contribute. The man who would refuse to support such a movement on the ground that it might benefit some who did not help pay for it could be expected to build a wall about his house for fear that passersby might enjoy its beauty.

Community Advertising

In many important cities community advertising is being done by the banks and trust companies. A series of advertisements instructs the public in matters of thrift and in the numerous services of the banking houses. Florists and photographers are doing the same in many cities, and by suggestion are creating an increased demand for the service these trades have to offer.

Is the florist selfish in suggesting ways of beautifying the home and the garden? It is not selfish for the photographer to suggest that a photograph of yourself would make an acceptable gift to a relative at Christmas time. The banker, while adding to the amount of deposits in his institution, is teaching the public to save, and doing something for the community.

So the manufacturer and dealer in permanent building materials, by successfully promoting his own interest, will be doing a public service. Every man who is encouraged to make his home fire-safe and depreciation-safe will be thankful to those who attracted his attention to the better method of building. Those who accuse the building-material interests of selfishness by urging fire-safe construction are themselves in a weak position.

Every argument is in favor of the concentrated effort. The strength of many individuals united and delivered in one stout punch will rapidly demolish the obstacles of ignorance, habit and misinformation that

now stand in the way of more general use of fire-resistant materials.

To make inroads upon the ninety nine per cent of building that is not consistently fire-safe requires the united effort of all the materials that are being kept out of this larger market.

It is no accident that the larger part of building money goes to inflammable materials. The interests that thrive upon burnable construction have won their easy way by skillful promotion. Just now those interests are spending more money than ever before to hold what they have, because they see it slipping from them.

The burning of children in firetrap schools, and almost weekly loss of life in poorly built factory buildings and shops, are the strongest possible arguments for consistent fireproofing.

The time is right for a national campaign of education that will make such tragedies as the Peabody school impossible in the future. But who will take the

initiative if those who may profit by better building fail?

Investigations there always have been, but when has one of them been carried to a conclusion? Public officials, seeking votes for re-election, and newspapers with advertising columns to sell, are not likely to antagonize any powerful interest by placing the blame upon the use of inflammable building materials. They play safe and dwell upon faulty fire escapes; the absence of fire drills; insufficient water supply and anything and everything except the real cause.

If a man takes poison and the doctor's effort to save his life fails, the death is not charged to the doctor, but to the poison.

The whole public must understand that the cause of death in a firetrap is not the absence of ways to escape, but that it is chargeable directly to the firetrap itself.

The S-A-F-E and CONSTRUCTION are the only agencies in America devoted exclusively to the task of bringing these facts to light. Are you, as a manufacturer, helping them?



A New Million-Dollar Playhouse

After three years of planning and construction work, the new Proctor Theatre at Newark, N. J., costing upwards of a million dollars, was opened to the general public on November 22d last. The attractive structure occupies a frontage of 35 feet on Market street, with depth of 120 feet, and the ground in the rear, on which is erected the main Palace and the roof garden theatre, extends over 75 feet by 150 feet. In all, close to 16,000 square feet of land have been utilized in the building operation.

In the basic construction the use of steel, iron and reinforced concrete has been absolute and dominant. The theatre front is entirely of white glazed terra-cotta and marble, "with a suggestion of rich color in polychrome tiles extending on each extreme side to the roof."

"Approximately, 2,800 persons can be seated at one time in the Palace proper, while 1,400 more can be accommodated in the roof theatre, which is quite as complete in every respect as its downstairs companion, for it has its own fully equipped stage, scenery, balcony, etc., with a dancing floor, cozy tea room, elevators, etc."

Mr. Proctor's representative in the actual construction work was Fred G. Webber, of New York City, while J. Wilson Morrow supervised the details of architecture, decoration and general embellishment. The general contractors, who likewise supplied the reinforced concrete and cement finish, were Fred T. Ley & Company, Springfield, Mass. Among the sub-contractors were: John S. Reid, heating and ventilating; William H. Connolly Company, masonry; Ralph B.

Schmidt, Inc., plumbing, all of Newark. Carr & Ball, Harrison, front stone; Manhattan Fireproofing Door Company, Springfield, Mass.; Leonard Sheet Metal Works, Hoboken, N. J., metal windows, etc.; Richmond Radiator Company, Chicago, cleaning system; De Paoli & Kelly, mosaic tile and terrazzo, New York City; Cassidy & Son, electric fixtures; Rockwood & Co., Worcester, Mass., automatic sprinklers; Lieberman & Sandford, ornamental iron; Davis, Laheng & Co., plain painting; Atlantic Terra Cotta Company, New York, terra-cotta; Pittsburg Plate Glass Company, Pittsburg, mirrors; B. Altman & Co., New York City, decorating and general furnishings.

The Safe has gathered data from seventy-five cities regarding the fire limits, fire losses, building regulations, standards, etc. This information is used to correct abuses in codes where non-burnable materials are not fairly treated, and to urge extension of fire limits.

The manufacturer no longer attempts to assassinate the entire business in which he is engaged in order to boost his own product. He has learned from bitter experience that it is unwise to create a distrust of a commodity simply to increase the sale of his own particular product.

Men no longer look upon one another in business as pirates, flying the black flag of ruinous competition and giving no quarter. We have come to the realization at last that while one is benefiting to a certain extent all are benefiting.

THE ROOFING OF LARGE BUILDINGS

(Continued from page 156)

utes in all the tests. The amount of smoke gradually increased during the early stages of the tests, but at no time was it given off in excessive volume. The roof covering ignited on the surface at 2 minutes in the Flame-Exposure Tests with air currents of 5 and 40 miles per hour, and at $3\frac{3}{4}$ and 2 minutes in the Burning-Brand Tests with the same air currents, respectively. Ignition took place in the areas directly exposed in each of these tests. Flames did not develop on the surface of the roof covering in the Radiation Tests. The spread of fire on the surface of the roof covering was confined to the areas exposed to the flames and gases of combustion from the directly exposed areas, and was limited in extent and mostly in the direction of the air currents. There was practically no tendency of the fire to spread sidewise.

In the Flame Exposure and Burning-Brand Tests, with air currents of 5 miles per hour, the spread of flame was slight. In the Flame-Exposure Test, the volume of flame was greatest at about 10 minutes and involved a triangular-shaped area 36 inches wide at the base and 42 inches long, just above the directly exposed area. After this period the flaming area and the volume of flame decreased rapidly, and at 30 minutes was confined to a few scattered jets of flame in the directly exposed area. In the Burning-Brand Test the volume of flame was greatest at 25 minutes, and involved a triangular-shaped area about 36 inches wide at the base and 18 inches long just above the burning brand. After this period the flaming area and volume of flame decreased rapidly, and at 38 minutes the flames were small and confined to the directly exposed area.

In the Flame Exposure and Burning-Brand Tests with air currents of 40 miles per hour, the spread of flame was rapid and the volume of flame somewhat greater than in the tests at low air velocities. In the Flame Exposure Test the flames reached the maximum volume at 6 minutes and extended over the greatest area at 10 minutes, when they involved an area about 36 inches wide just above the directly exposed section and 18 inches wide at the top of the test sample. The flaming area and the volume of flame decreased rapidly after this period, and at 30 minutes the flames were small and confined to the directly exposed area. In the Burning-Brand Test the volume of flame was greatest at 8 minutes and involved a triangular-shaped area about 36 inches wide reaching from the brand to the top of the test sample. At 20 minutes the flames were confined to the directly exposed area.

Insulation.—The roof covering transmitted sufficient heat to cause the charring and partial consump-

tion of the deck boards in all of the tests; to cause the ignition of the boards in the Flame Exposure and Burning-Brand Tests with air currents of 40 miles per hour, and in the Radiation Test with air currents of 5 miles per hour; and to cause the falling out of portions of the boards and roof covering in the Flame Exposure Test with air currents of 5 miles per hour. In the Burning-Brand Test with air currents of 5 miles per hour, and the Radiation Test with air currents of 40 miles per hour, the roof coverings did not transmit enough heat to cause the boards to ignite or fall away during the tests.

In the Flame Exposure Test with air currents of 5 miles per hour, the roof covering was more or less damaged over a triangular-shaped area 36 inches wide at its lower end and 82 inches long. The pitch and felt were completely incinerated over a triangular-shaped area 33 inches wide by 40 inches long. At the middle of this area, a section of the roof covering about 4 inches wide and 6 inches long had fallen out. The disintegration was less extensive in the damaged sections surrounding the above-mentioned area.

Smoke issued from the cracks between the deck boards 15 minutes after the test was started; redness in the roof covering and charring of the boards were visible at the cracks between the boards at 25 minutes; glowing coals developed in the cracks between the boards at $56\frac{3}{4}$ minutes; a small hole through the roof covering was visible at 1 hour and 22 minutes; a small portion of the deck fell from position at 1 hour and 42 minutes; and a fairly large piece of the deck fell through at 2 hours and $25\frac{1}{2}$ minutes, followed by a small piece of the roof covering 2 minutes later.

The deck was more or less damaged and discolored over a triangular-shaped area about 35 inches wide and 60 inches long. Under the directly exposed section, the boards were charred to their full depth over a triangular-shaped area about 23 inches wide by 33 inches long. Portions of the boards in this area had fallen out. The boards were slightly charred over an area about 18 inches wide and 24 inches long, just above the completely charred section. They were more or less scorched and stained at the sides of the charred area.

In the Flame Exposure Test with air currents of 40 miles per hour, the disintegration of the roof covering was slightly less extensive than in the test with the lower air velocity. The incinerated area was a little smaller and none of the roof covering fell out.

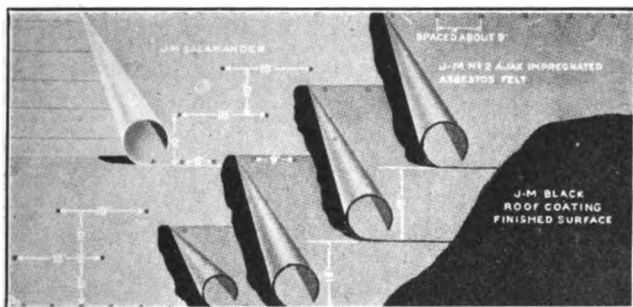
Smoke issued from the cracks between the deck boards at $12\frac{1}{2}$ minutes; redness in the covering was visible through the cracks between the boards at 20 minutes; glowing coals developed in the cracks be-

tween the boards at 25 minutes; and continuous flame issued from the cracks at 40½ minutes.

The deck was more or less damaged and discolored over a triangular-shaped area about 32 inches wide and 60 inches long. Under the directly exposed section, the boards were charred to a depth of 11-16 inch over an area about 32 inches wide and 40 inches long. At the sides of this latter area and extending to about 20 inches above it, the charring varied from ⅛ to 3-16 inch in depth. The boards were scorched and stained several inches from the charred area.

In the Burning-Brand Test with air currents of 5 miles per hour, the roof covering was more or less damaged over an area about 36 inches wide and 56 inches long. The pitch and felt were carbonized to a marked extent in the directly exposed area, particularly in the areas between the strips forming the brand. The pitch and three upper felt layers in the section just above the burning brand were also considerably carbonized.

Smoke issued from the cracks between the deck boards 25 minutes after the test was started. No



Built-up roofing. H. W. Johns-Manville Co. Asbestos felt used

charring was visible in the cracks between the boards, no color in the roof covering due to heat was visible, and no glowing coals or flame developed on the under side of the deck during the test.

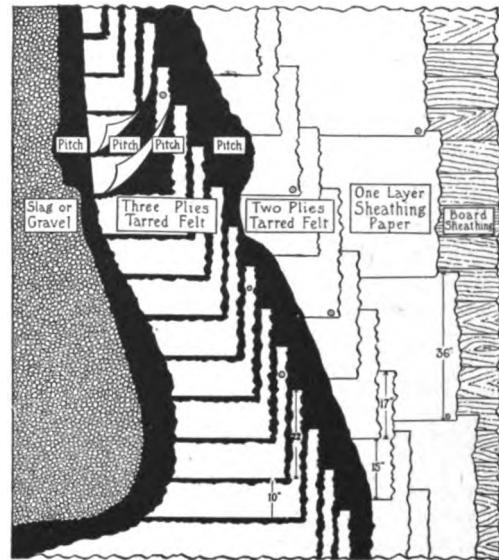
The deck was more or less charred in the area under the burning brand. The sections between the strips forming the brand were charred to a depth of ⅛ to ¾ inch, averaging about 3-16 inch. The sections directly under the strips were scorched and slightly charred.

In the Burning-Brand Test with air currents of 40 miles per hour, the damaged area was somewhat larger, but the disintegration of the roof covering in the directly exposed area was not materially different from that resulting from the test with the lower air velocity.

Smoke issued from the cracks between the deck boards 15 minutes after the test was started; a glowing coal developed in one crack between the boards at 36 minutes, followed by a small flame ½ minute later. The flame was 3 to 4 inches long at 37½ minutes, but showed no marked tendency to spread at 38½ minutes.

The deck was more or less charred in the area under

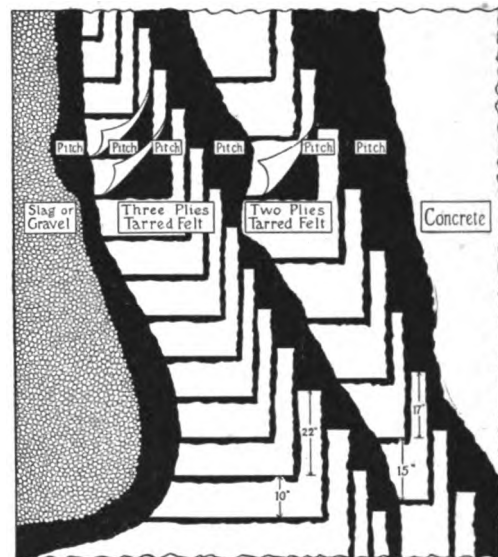
the burning brand. The charring was most severe in the upper third of this area, where the boards were charred to a depth of ⅛ to ¾ inch. In the lower portions of the area, the charring did not exceed about ⅛



Method of building up Barrett Specification roofing on combustible roof deck

inch in depth, and was most marked in the sections between the strips forming the brand. The boards were scorched and stained in the sections under the strips, and in the sections just above the directly exposed area.

Flying Brands.—No part of the roof covering was



Method of building up Barrett Specification roofing on incombustible roof deck

carried off by the air currents in any of the tests. Any portions of the felt layers which may have been weakened by fire were held in position by the gravel.

Blanketing Influence.—Examinations of the samples after the Fire Tests showed that the strength of the
(Continued on page 183)

OFFICIAL PAGE
SOCIETY ADVOCATING FIRE ELIMINATION

NATIONAL HEADQUARTERS
356 LEADER-NEWS BUILDING,
CLEVELAND, OHIO



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The Modern Way

The great weakness in business is the lack of proper advertising. There is an old saying to the effect, "If you make a better mouse-trap, write a better book, etc., the world will beat a pathway to your door, although your home may be in the wilderness."

That might have been the old system of looking at things, and it would be true of industry years ago, but times have changed and our business system is more complex. In this age, if you want a man to beat a pathway to your door it is certain that you must beat your own drum in order that he may know where you are and what you have. For if you do not give him the information, some other industry will, and instead of locating the path which leads to you, he will locate the one which leads to the other fellow.

Why not bring home to the people the danger from fire which is ever present from frame construction? Why not show them the loss of human life through this flimsy and careless building of inflammable materials? Why not show them the actual economy of safe construction?

What the good roads movement has been to the paving brick industry, this movement will be to the Safe material interests. All people who have thought upon the subject believe in the economy of good roads, and believe that economy is carried to a higher degree through building with good material. The Society Advocating Fire Elimination not only brings this mes-

sage home clearly to the people, but it goes further and demonstrates that human life and human happiness can best be served through this safe and non-burnable construction.



There is no necessity for subterranean passages when the pathway is so clearly defined. Sooner or later any industry which endeavors to blindfold the people and lead them on false paths will be brought to grief.



S-A-F-E ACTIVITIES

Seventy-five per cent of the available space in the Complete Building Show, in which The Safe members are vitally interested, already has been sold to exhibitors. The fact that this exceptional result has been obtained without solicitation on the part of those having the show in charge indicates the great interest the trade is taking in this coming demonstration.

"Don't Let It Happen Again" is the title of a new folder just issued by The Safe for circulation among owners of commercial buildings destroyed or seriously damaged by fire. It is a sermonette on the economy of safe building, and one which should lead these "sinners," when they rebuild, to avoid the sawdust trail of flimsy building and attain grace through the medium of Safety First.

SAFE HOMES



A DEPARTMENT OF "CONSTRUCTION"

Devoted Exclusively to the Interest of the Home Builder

Edited by Ralph P. Stoddard



ONE of the least convincing things in connection with America's fire loss is a table of figures. It is an old story, yet a good one, that when an investigator went to a Government statistician for data, the latter's first question was: "What do you want to prove?"

That no man may be misled by figures relative to the fire loss of the country, it may be well to give notice here that a fresh crop of statistics has just been harvested by The National Board of Fire Underwriters. Like all statistics they become ancient history before they reach the public, and these figures are for the fire losses of 1914. It is the latest edition, however, and while the minds of those who are awake are just now centered upon the figures 1916, these two-year-old compilations are being analyzed and juggled by varied interests, each to prove its case.

There would be no harm in this pastime if it was not for the powerful agencies back of certain industries that cause general publications of "conclusions" arrived at by "experts" tending to show that inflammable materials are not inflammable. Already the lumber interests are trying to prove, by the Underwriters' figures, that it is as safe—or more safe—to live in a wooden building than in a brick building. Taking the insurance agencies' own figures, the lumber-trade papers are able to show that in many sections of the country there are fewer fires in frame buildings than in masonry buildings, concluding that bricks, cement and metal products ignite more readily than shingles, clapboards and other kindling material.

Of course, it doesn't seem possible that any thinking person will be deceived by this analysis of the fire figures, because common sense disputes the conclusions.

Yet many persons accept what they read in the newspapers, and it is necessary to say that the figures are unreliable and almost libelous in their nature.

In the fire figures now being widely circulated and

quoted in general newspapers, an apartment, occupied by many families, counts as one unit, just as does the single residence occupied by one family. This permits an apartment, with brick exterior and a firetrap interior, occupied by sixty families, to be compared with a small cottage of frame, housing one family and widely separated from other buildings. The apartment normally is located in a congested district. The larger they are the cheaper the rent, usually, and the more flimsy the construction. Consequently, a fire occurring in a structure where the chances for fire are more than sixty to one must show a record equal to the isolated frame cottage.

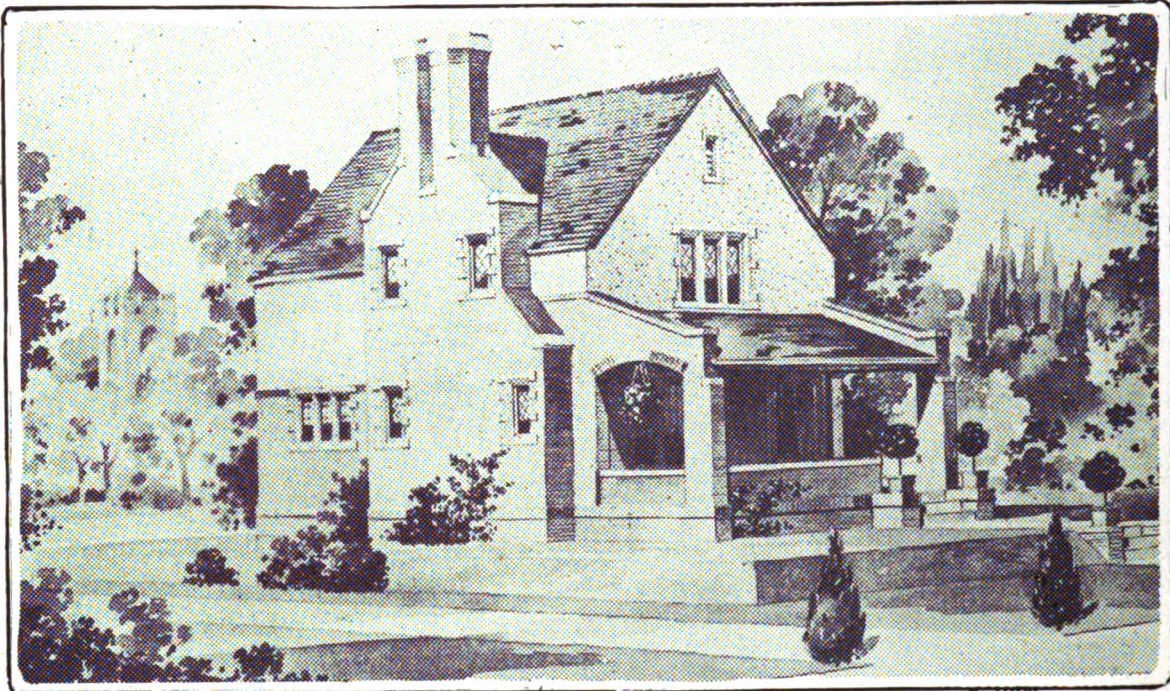
Another reason why the fire figures are undependable and not worthy a reading is the failure to designate the character of roofs. Houses with firesafe roofs cannot fairly be compared with houses with unprotected roofs, no matter what the nature of the exterior walls.

Home builders should not be deceived by any "conclusions" arrived at by those who analyze the fire figures to prove their own selfish contention. Use your own judgment. Answer in your own mind whether a house built entirely of inflammable material is not more likely to catch fire than one with an exterior entirely of material that you know cannot catch fire.

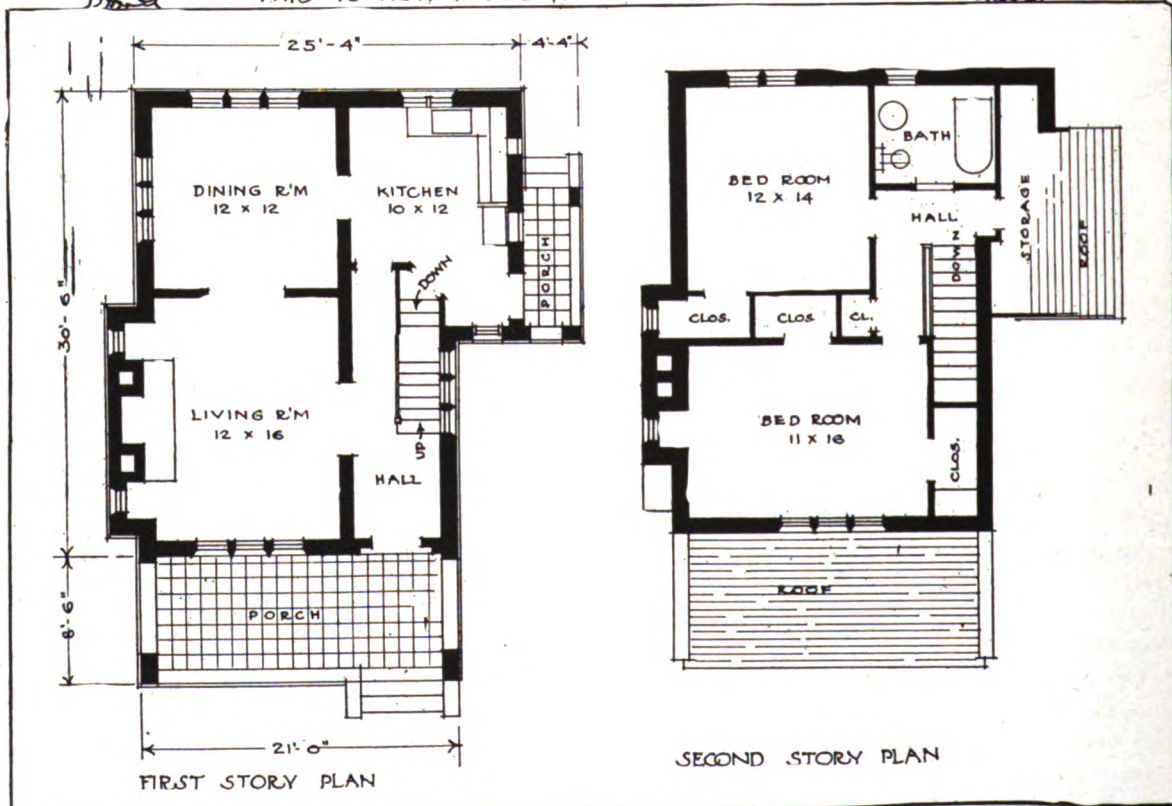
Equally important with the safety is the question of comfort and economy, and close behind that is beauty. The fire figures do not tell one that the frame house is the most expensive construction possible to build. Your own experience will tell you that, if you are now the owner of a frame house.



For more than one hundred years the insurance companies have carefully compiled statistics showing actual results, and from these they say that the chance of a bad fire in your city is from two to three times as much if buildings are all of frame construction, as it is if they are of firesafe material.



THIS IS HOW PRIZE HOUSE WILL LOOK



A PRIZE HOUSE TO BE GIVEN AWAY AT THE COMPLETE BUILDING SHOW,
CLEVELAND, FEBRUARY, 1916

A Firesafe House Will Be Given Away at the Cleveland Building Show

TO furnish a monster drawing-card for attendance at the Complete Building Show, to be held in Cleveland during February, a Prize House is being erected there to be given away at the Exposition.

Ground for this ideal home has been broken and the foundations in. The exterior probably will be virtually completed and the roof on by the first of the new year.

This Prize House is located on the Lake Shore Boulevard, one of Cleveland's finest thoroughfares, skirting the lake eastward from the city. It will furnish a demonstration of the use of an exceptionally great number of materials in residence construction. Among these are brick, tile, lumber, stone, concrete, gypsum, asbestos and expanded metal. For example, the first floor will be constructed of self-centering and concrete, upon steel beams, especially built up to provide lightness; the second floor will be of timber construction, after the common practice.

In addition, the house will embody many new labor-saving and safety devices, some of which will be there seen for the first time, which will do much toward making it a truly "model" home and one which will be a real "prize" for the winner.

The contest, under which it is planned to make the award of the house, will be entirely original. It will

not be based on the usual plan of chance or guesswork, as is usual with awards of this kind. Instead, it will be along the line of a popularity voting contest, which will necessitate a careful study of the show and its exhibits on the part of competitors, in order to make an intelligent showing on their part. The element of fortunate chance thus is eliminated and the contest linked directly with the exhibits. Thus the maximum of the benefit accrues to those who make the show and whose co-operation makes it a success—the exhibitors.

The details of this competition are in the hands of a committee, which will shortly make a definite announcement of its workings.

As to the house itself, which is shown in the accompanying illustration, it leaves little to be desired, in a small home, in the way of design or arrangement. It provides five excellently planned rooms, every one light and livable. Features of a house costing from two to three times as much are embodied in it. The building is only twenty feet wide by thirty feet long.

The Prize House is from the boards of Architect Ed. A. Ruggles, a prominent Cleveland designer, who has made a specialty of "homes that are different." And this one compares more than favorably with his more pretentious efforts.

THE ROOFING OF LARGE BUILDINGS

(Continued from page 179)

roofing is destroyed where the heat is sufficient to incinerate or badly carbonize the felt and pitch, and that sections so affected are brittle and incapable of remaining in position unless supported by the roof deck at practically all points.

Examinations of partly damaged sections show that the roofing possesses considerable strength after most of the pitch has been driven out by heat and the felt layers partly carbonized. Roof coverings so affected are capable of sustaining their own weight in moderate spans between supports.

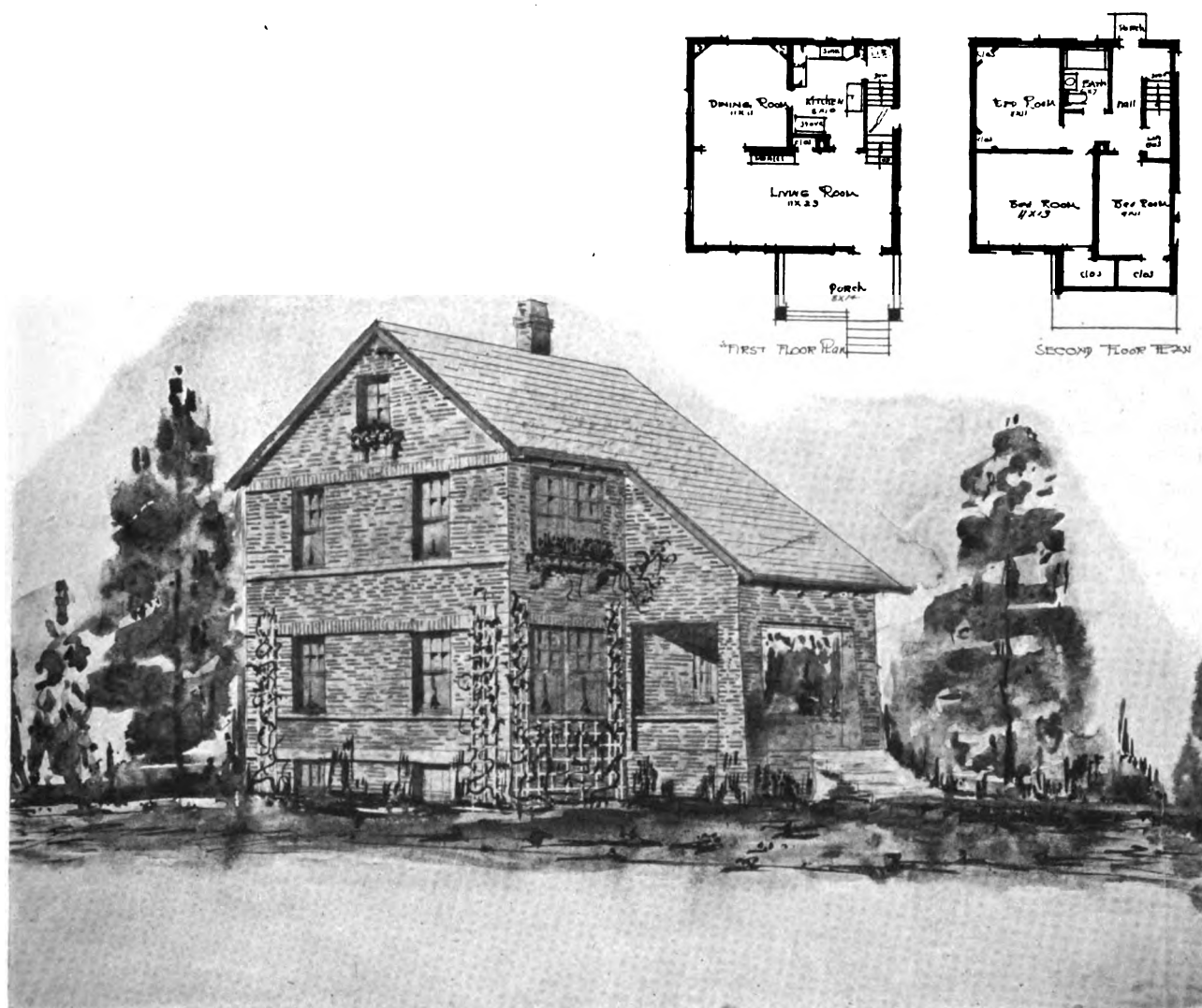
The results of these tests show that good built-up roofings properly surfaced are not readily flammable, do not carry or communicate fire to any material extent, afford a relatively high degree of insulation against heat, are not liable to slip from position when exposed to heat, possess little or no flying-brand hazard and possess considerable blanketing influence upon fires within the building.

Ready roofings possess little flying-brand hazard and communicate and carry fire slowly. The blanketing

effect is negligible and they do not offer a high degree of insulation. They have the advantage of low initial cost, easy handling and offer protection against the conflagration hazard. Care must be taken in selecting a ready roofing to inquire into its degree of permanency.

There are a number of prepared or ready roofings on the market. These ordinarily come in rolls accompanied by the nails and cement necessary to apply them. They vary from a very light felt with the cheapest possible saturant and enough sand or soapstone coating to prevent sticking in the rolls, to a sheet so heavy that it cannot be rolled, built up of heavy felts and strengthening materials and saturated and protected by carefully prepared compounds, possibly protected also by a coating of crushed stone. The durability and fire-resisting value vary to as great a degree. Ordinarily the ready roofings are cheaper than other types, but some brands sell at prices considerably above the cost of a good built-up roof. To a certain extent,

(Continued on page 188)



MEETING THE PRICE OF ALL-FRAME CONSTRUCTION

An attractive brick house to sell at \$4,500

IT has remained for Jas. J. Hinde, a well-known business man of Sandusky, Ohio, to make the best demonstration, up to the present time, of the low-priced, fire-safe house for those who demand a brick exterior.

While other real estate and building operators have held back, fearful of initiating the movement, he has forged ahead, and has two houses of consistently fire-safe type, which he is offering for sale at prices to compete with others of frame in the same allotment.

These ideal homes, one of which is herewith illustrated, are located in Cleveland, on East 133d street, near St. Clair avenue. They are being visited daily by hundreds of persons who are interested in studying the possibilities of safe construction as applied to the small home. They will remain open to the public for several weeks before being sold, in order to give the widest possible publicity to the demonstration. Architects,

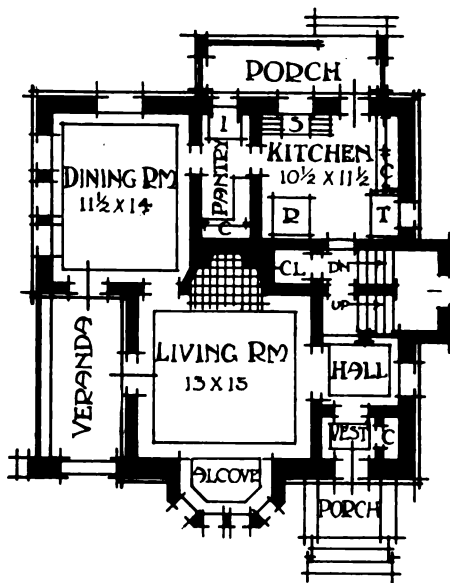
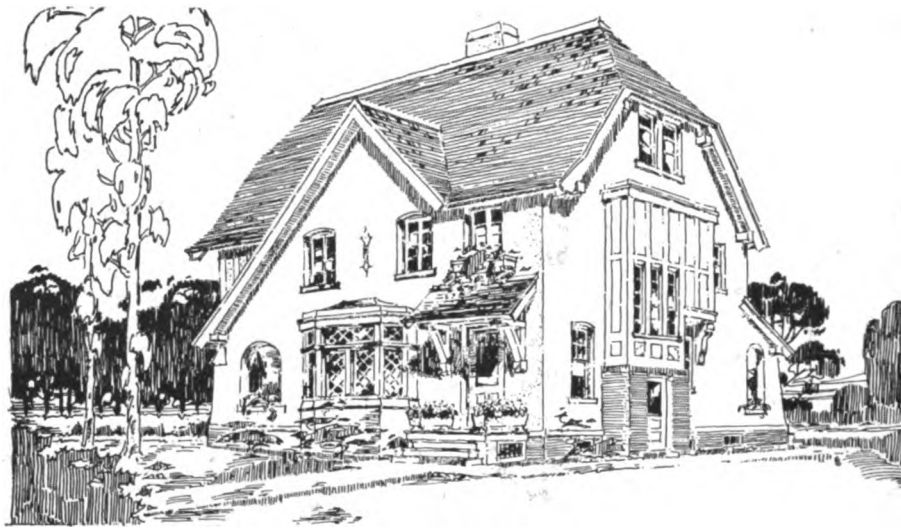
builders and real estate operators, as well as prospective home builders, are among those who have paid these ideal houses a visit.

In these houses the last word in simplicity has been attained. They are constructed with a facing of common brick over hollow building tile. The roofs are of slate. There is an entire absence of dormers or bay windows—yet what beautiful residences are the result! They are perfect demonstrations of the application of safe materials to home building.

The house shown contains, as will be seen, six good-sized rooms, each with enough windows to light and ventilate well, and with ample closet space. One room has been provided in the third story, as well as a space for storage. The arrangement of the other house is equally good.

Both houses are equipped with combination gas and

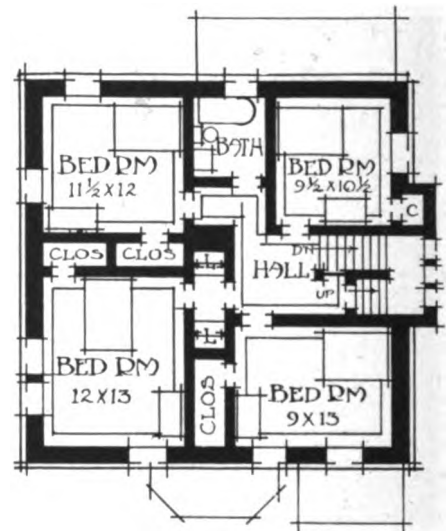
(Continued on page 187)



First floor plan

A GERMAN HOUSE

No. 124



Second floor plan

THERE is much to admire in German architecture of the modern school, particularly the tinted stucco so commonly utilized by the German designers and builders.

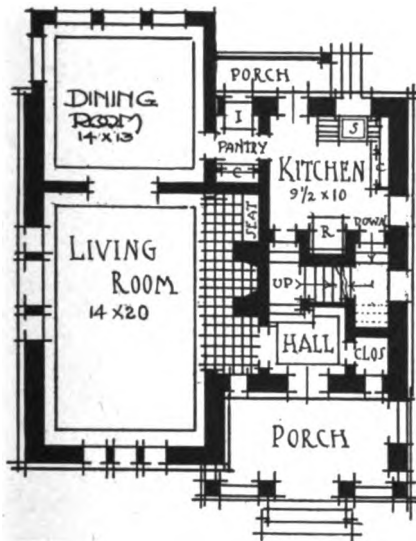
The home here illustrated is an adaptation from a residence in Munich built a little more than a year ago. Like its prototype, the walls of this house are of buff-colored stucco; the exterior woodwork is stained a warm brown and the sashes white. A green tile or asphalt-shingle roof and red brick foundation give added color to the picture the house presents in its finished state.

While designed for walls of tile or brick, the com-

monest materials in Germany, this home could be Americanized to employ expanded metal and cement on either a wood or steel framework.

As to the interior arrangement, there are so many excellent features it is all but impossible to enumerate them. The John Henry Newson Company, Williamson Building, Cleveland, have produced a house complete in every respect and which meets every demand, including a porch, which may be enclosed in winter with glass, and a billiard room in the third story.

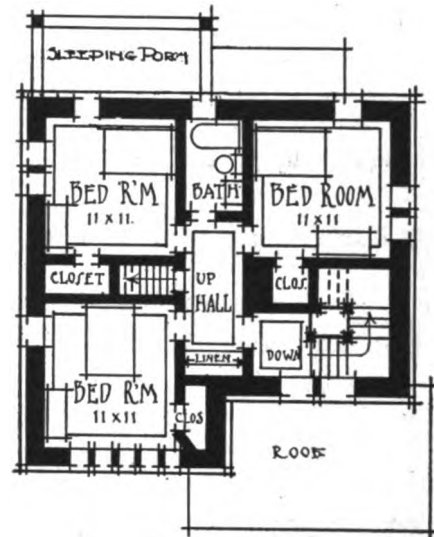
The architects estimate its cost at from \$5,000 to \$6,000, according to the material used and the elaborateness of the interior finish.



First floor plan

A
MODERN
ENGLISH
HOUSE'

No- 123



Second floor plan

IN the accompanying cut is shown an excellent example of the modern English home. The roof lines and broad plaster surfaces, broken by groups of windows, are well adapted to the American idea of the "Home Beautiful."

The durability of cement and the absolute waterproofing mixtures upon the market make its use in connection with hollow tile, brick or expanded metal a perfectly satisfactory material for home construction.

A glance at the plans will show that the designers in the office of The John Henry Newson Company, in the Williamson Building, Cleveland, have utilized every available inch of space and have provided an exceptionally livable home.

The cost of this house, constructed with a consistently fire-resistant exterior, is estimated at about \$5,000 complete.

Meeting the Price of All-Frame Construction

(Continued from page 185)

coal furnaces, meter boxes, garbage receivers, incinerators and other appliances not found in the usual houses built for sale.

The fact that these houses are to be offered for sale at about \$4,500 in an allotment, where frame houses of the same size are selling for a similar price, has attracted great attention. Never before has an attempt been made to thus compete with frame on an equal basis. The fact of every piece of material and every fitting in these houses being of first quality, taken with the superior type of construction, makes them in reality lower priced than the frame houses which they adjoin.

The fire-safe home of low cost has been found, beyond all shadow of doubt.



Slipping Kills More People Than Fires and Surface Cars Combined

Coroners' records from New York City (Manhattan), in 1914, show **87 people killed by slipping on steps and sidewalks.** There were 65 killed by fires and 53 by surface cars in the same district and time.

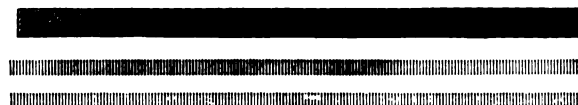


Be On The Safe Side

The Universal Safety Standards specify the use of **ap-proved anti-slip treads.**

"FERALUN" anti-slip treads are approved.

Send for Sample and Full Information



THE ROOFING OF LARGE BUILDINGS

(Continued from page 183)

the weight is designated by the ply, but there is no uniformity of practice among the different manufacturers. A two-ply roofing may mean a heavier weight than a one-ply, or it may mean two separate felts stuck together.

One of the chances for trouble with many of the ready roofings is their tendency to stretch and wrinkle and the difficulty in laying them absolutely tight and flat. As the roofing grows older and brittle the wrinkles become danger spots which are liable to crack if walked on.

The roofing should be as thoroughly stretched as possible in laying. Knot holes should be covered before applying the roofing. In cold weather it is well to warm the rolls to avoid any chance of cracking their protective coating, as it cannot easily be held in place in proper quantity without the stone coating. The protective coating must be stable and not easily affected by changes in temperature. Blown oils are frequently used for this purpose. The smooth-surfaced roofings, as a general proposition, have less insulating and fire-resisting value than the heavier stone-surfaced materials. For the smooth-surfaced roofings a regular

painting or recoating is usually necessary, in order to get the best life.

Tarred felts in which there are two or three plies of felts cemented together with pitch are sold all ready to be laid. They must be covered with a tar coating upon laying and at frequent intervals to show any value at all.

The asbestos roofings are made to include one or more plies of asbestos felt, with possibly a jute center. They are cemented together by asphaltic cements. In the heavier brands they are expensive. The asbestos felts are poor saturants. These roofings have given promise of good results and are widely used. The asbestos will not burn, but the amount used is so small that its insulating value is not great, and the value of these roofings from the standpoint of fire protection is probably frequently overestimated.

The prepared roofings may be divided into two general classes—smooth and stone-surfaced. The stone-surfaced roofings are to a certain extent an adaptation of the built-up roofings. They frequently have at least two felts cemented together. The gravel or slag used must be uniform in size and finer than that available for a built-up roof. The steeper the roof the more chance they have to lose their stone coating. The amount of material that can be used in the heavier brands is limited to the amount that can be successfully rolled. If the stone be too large, the stone may damage the felt in rolling; if too small, the amount of pitch is limited.

Tile or brick can be substituted for the gravel or slag where the roof is liable to have much wear and when the structure warrants the expense. The tile are sometimes grouted in Portland cement, but a bituminous cement is usually considered better. Properly built, this makes almost an ideal roof.

When the type of roof is decided on and ordered it is not the time to consider the question closed. Careful attention must be given to the laying of the roof. The work must be clean and orderly. Flashings and work around openings are of great importance, for here are the weak points of many roofs. The roof must be properly pitched to the gutters, which must be of careful design. The roof should be carefully inspected at least once a month.

Remember that the fire-resisting and blanketing qualities of the roof are of extreme importance, and do not forget to count the *ultimate cost*. Only when the buildings of America are properly roofed will the conflagration hazard become a danger of the past.

Work upon a five-story brick apartment on Johnson, near Clinton avenue, Newark, N. J., began on December 1st. The structure, designed by Edward V. Warren and being erected by the J. H. Mazel Company, will cost \$100,000. Brick will be the material principally used.

STANDARD FIREPROOFING PRODUCTS.

REYNOLDS

FIRE SAFE

SHINGLES

TESTED by the Underwriters laboratories under their standard tests, Reynolds Shingles have proven themselves worthy of classification as fire preventatives.

Reynolds Shingles have a top surfacing of granulated slate, granite, etc., and they positively will not ignite from flying sparks or brands. Where fire originates inside the building they have a marked blanketing influence.

We call them "Safety First" because they protect from rain or storms, from heat or cold and from the common agencies which spread fire.

Reynolds Shingles are the standard asphalt Shingles and you will make no mistake in insisting on Reynolds Shingles.

If your dealer cannot supply you write the factory.



H. M. Reynolds Asphalt Shingle Co.
"Originators of the Asphalt Shingle"
Grand Rapids MICHIGAN

SAFE REAL ESTATE

Our Beach Grove Allotment on Lake Shore Boulevard has been selected as the site for the modern Fire-Safe Home to be erected this fall by the Society Advocating Fire Elimination.

Cleveland's Lake Shore property is scarce and grows steadily in value.

Our allotments have been located in this section for that reason.

You will be safe in placing your Real Estate wants of any kind in our hands.



GENERAL REAL ESTATE

Ground Floor, Williamson Building
CLEVELAND, OHIO

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One-half of a Brick is Service

You not only need brick for your Building Operation but you must have them when you want them.

We have anticipated the demands of a growing city. Every year we increase our output and our service equipment.

We are now prepared for 1916 BUSINESS.

The Farr Brick Co.
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OUTBUILDINGS ARE AS LIKELY TO START A CONFLAGRATION AS MAIN BUILDINGS

WITH
BOSTWICK TRUSS-LOOP METAL LATH AND PLASTER

YOU HAVE A CONSTRUCTION THAT IS HIGHLY FIRE-RESISTIVE, OF LOW FIRST COST AND NEGLIGIBLE UP-KEEP EXPENSE.



LET US KNOW YOUR REQUIREMENTS, WE WILL BE GLAD TO ADVISE YOU.

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STANDARD FIREPROOFING PRODUCTS.



MAGAZINE is measured by the value of its service.

CONSTRUCTION represents eleven months of constant investigation, research, tabulation of data, conferences and other work, part of which was an extended tour of the eastern and central western states to present the propaganda of the publication and learn what leading professional and business men related to fireproofing thought of the proposition. Prominent architects and engineers, large contractors, almost all the leading manufacturers, fire chiefs, association secretaries, municipal building officials and others were among those interviewed. The results of the trip are most encouraging, proving that the planning has been along proper lines and that men realize both the power and the need of intelligent national publicity to advance firesafe building.

You now have an opportunity of analyzing CONSTRUCTION—of passing upon the first results of all the past months' work. What do you think of it? Study it carefully—then give us the benefit of your candid thought, be it encouragement and appreciation or a kindly word of constructive criticism; one will be as sincerely welcomed as the other; all are guiding thoughts which point the way to greater SERVICE.

Fireproofing Information Bureau

¶ In establishing this complete reference service, manufacturers and others producing catalogs, house organs, price lists, etc., are requested to forward their printed matter and samples and place CONSTRUCTION on their permanent mailing lists.

¶ The FIREPROOFING INFORMATION BUREAU is intended for the use of resident and visiting architects, engineers, contractors and the general business and professional firesafe building fraternity, as well as prospective building owners, to whom its use will be extended gratuitously.

¶ Every effort will be made to develop and maintain this Bureau to a high point of efficiency.

¶ Prompt cooperation is solicited.

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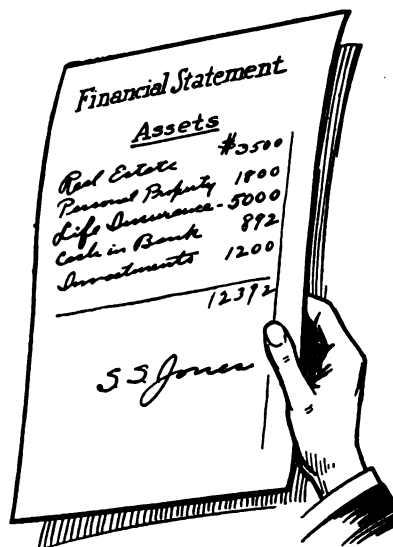
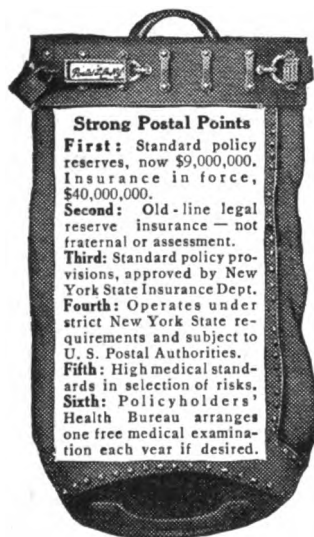
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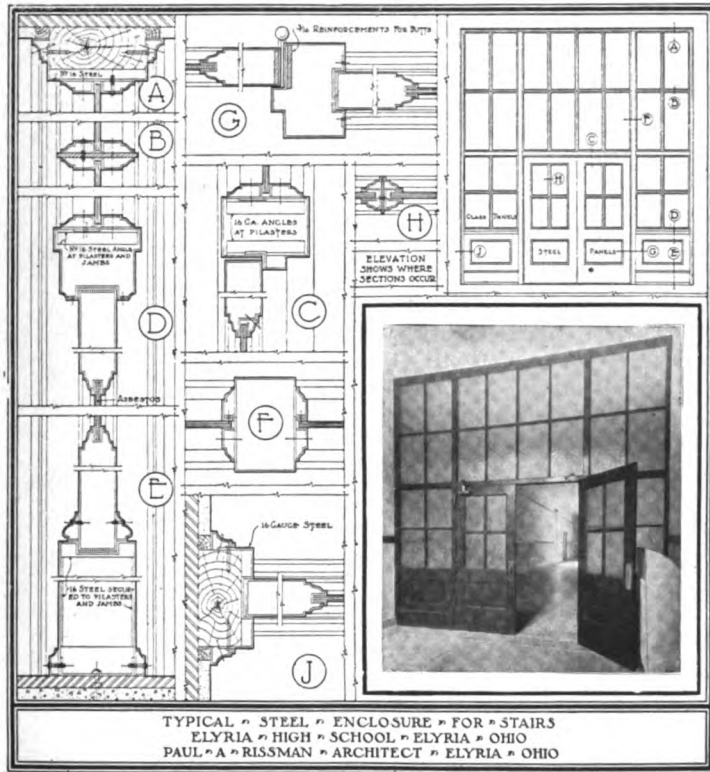
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DECEMBER, 1915

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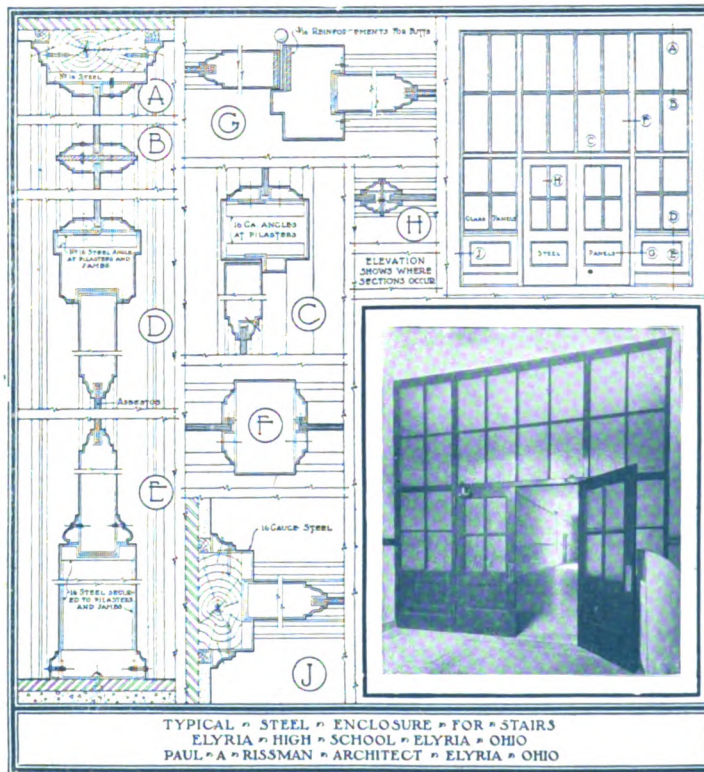


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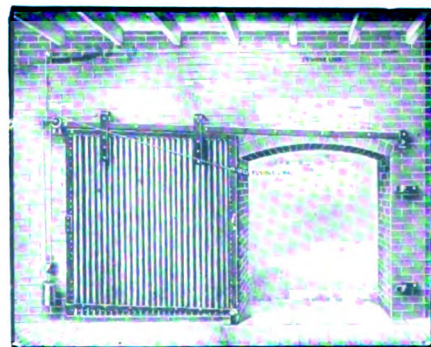
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